"Autumn Road" by www.c4d-jack.de

Background: "Stony River" by Fredi Voss

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Although software and manual have been made with all possible care and accuracy, errors can never be completely prevented, due to the multiplicity or different hardware and software configurations. Therefore, the author does not take responsibility for damage caused by software failures or by wrong descriptions in this manual.

System requirements

Maxon Cinema 4D R10.1, R10.5, R11.0, R11.5
PC (32 Bit, 64 Bit)
Mac (Intel; 32 Bit, 64 Bit)
64 Bit recommended
Compatible with VrayForC4D

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Contents

1. Introduction....7
1.1. About SurfaceSPREAD....7
1.2. Installation....8
1.2.1. Installation of the Plug-in....8
1.2.2. Installation of the license file....8
1.3. Components....9
1.3.1. SurfaceSPREAD Object....9
1.3.2. SPREADscape Object....9
1.3.3. SPREADrock Object....9
1.3.4. Wire Object 9
1.3.5. SurfaceSPREAD Shaders....10
1.3.6. SurfaceSPREAD Data Node....10
1.3.7. SurfaceSPREAD Commands....10
2. Parameters in Detail....11
2.1. SurfaceSPREAD Object....11
2.1.1. General 11
2.1.2. Distribution 14
2.1.3. Alignment 24
2.1.4. Effects 26
2.2. Distribution Modifier....29
2.2.1. Ignore Y 29
2.2.2. Spline 29
2.3. Scale Modifier....29
2.4. SPREADscape Object....30
2.4.1. General 30
3. Base Layer 31
4. Detail Layer (1 – 6)....32
5. Layer Type "Noise"....33
6. Layer Type "Spline"....34
7. Layer Type "Material"....35
8. Shaping 36
8.1.8. Phong 36
8.5. SPREADrock Object....37
8.5.1. Object 37
9. Structure38
10.Presets 39
10.6. Wire Object....40
10.6.1. Type 40
10.6.2. Close Spline 40
10.6.3. Intermediate Points....40
10.6.4. Number, Angle, Maximum Length....40
10.6.5. Show Visualization....40
10.6.6. Add Path Objects....40
10.7. Distribution Override Tag....41
10.8. SurfaceSPREAD Clone Shader....42
10.8.1. Gradient 42
10.8.2. Source Data 42
10.8.3. Noise 44
10.9. SurfaceSPREAD Distance Shader....45
10.9.1. Start 45
10.9.2. Depth 45
10.10.SurfaceSPREAD Road Shader....46
10.10.1. Asphalt 46
10.10.2. Marks 46
10.10.3. Tiremarks 47

10.10.4. Cracks 47
10.11.SurfaceSPREAD Data Node....49
10.11.1. Object (Input) 49
10.11.2. ObjIndex (Input) 49
10.11.3. ObjCount (Output)....49
10.11.4. Position (Output) 49
10.11.5. Rotation (Output) 49
10.11.6. Scale (Output) 49
10.11.7. Global Matrix (Output)....49
10.11.8. Poly Normal (Output) 49
10.11.9. UVW Position (Output) 49
10.11.10.Weight: Constrain (Output) 50
10.11.11.Weight: Geo (Output) 50
10.11.12.Weight: Performance (Output)....50
10.12.SurfaceSPREAD Commands....51
10.12.1. Toggle SurfaceSPREADs....51
10.12.2. Enable SurfaceSPREADs 51
10.12.3. Disable SurfaceSPREADs....51
10.13.SurfaceSPREAD Library 52
10.13.1. Terms of Use 52
10.13.2. Installation 52
10.13.3. Usage 52
3. Using SurfaceSPREAD....53
3.1. Create a forest on a landscape 53
4. Fill a bookshelf with books....59
4. Appendix 65
4.1. Frequently asked questions (FAQ)....65
5. What will not work? 66
5.3. Troubleshooting....66
5.3.1. Improving SurfaceSPREAD performance 66
5.3.2. Improving SPREADscape performance....66
5.3.3. Delayed refresh of SurfaceSPREAD Object 66
5.4. License Agreement 67
5.5. Alphabetical Index 70

1. Introduction

This chapter will give you an overview of SurfaceSPREAD, explain the installation of the plug-in and license file, and introduce the components of the plug-in.

1.1. About SurfaceSPREAD

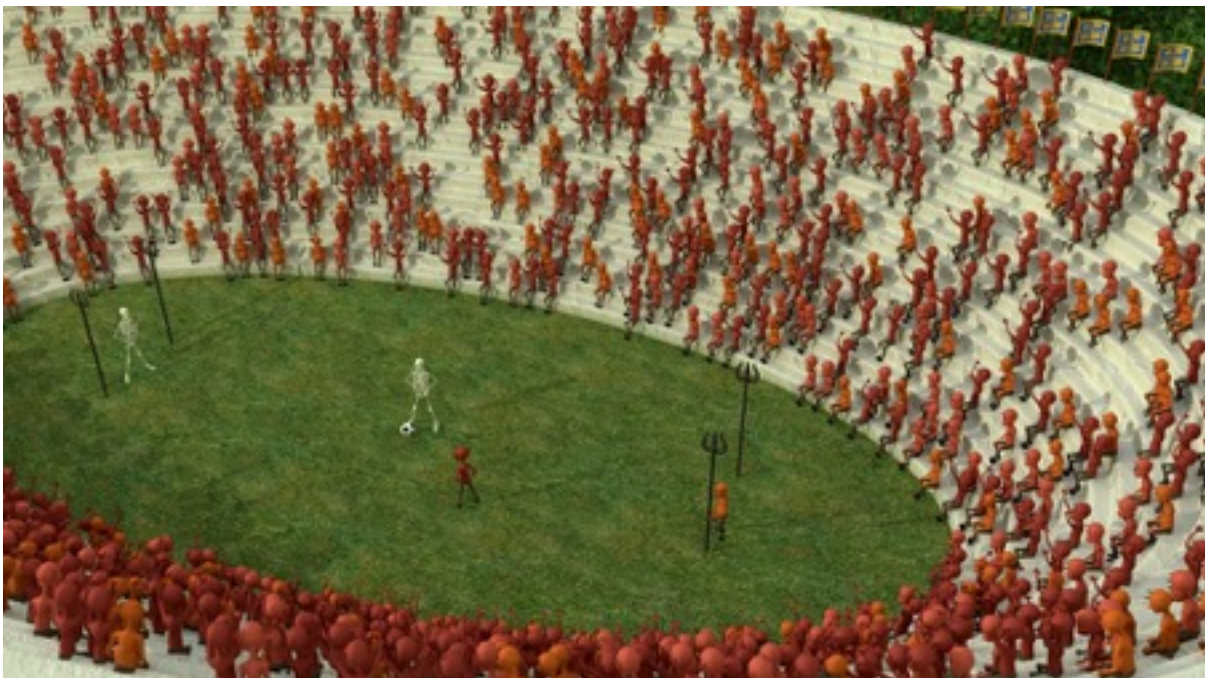
SurfaceSPREAD is a plug-in for Cinema 4D specifically designed to distribute large amounts of object clones onto landscape scenes in a way that is reactive to the landscape's topography, creating realistic images and animations that are not exceedingly regular, nor overly chaotic.

It is also a high-quality landscape generator, expanding on Cinema 4D's own limited landscape objects to allow users to create elaborately detailed and customizable terrains, complete with lakes, rivers and streets, that look great in the foreground, as well as in the distance.

This easy-to-use alternative to manual modeling and distribution of landscapes and objects will save users time and money, while also allowing for interactive design within Cinema 4D. This is a huge advantage over external applications that require import/export protocols that interrupt the user's workflow, require manual cleanup and don't always carry over all the required information.

In this manual, you will discover all of the components and functions of SurfaceSPREAD, including the many settings that can be used to influence the positioning and alignment of object clones, such as trees, distributed over equally adaptable and lifelike landscapes, as well as other surfaces.

SurfaceSPREAD also interacts well with a lot of Cinema 4D built in functionality such as Hair and, unlike some other solutions, there is no limitation on what type of object can be distributed.



"Football stadium" by Knut Schröder, SurfaceSPREAD was used for the spectator crowd.

1.2. Installation

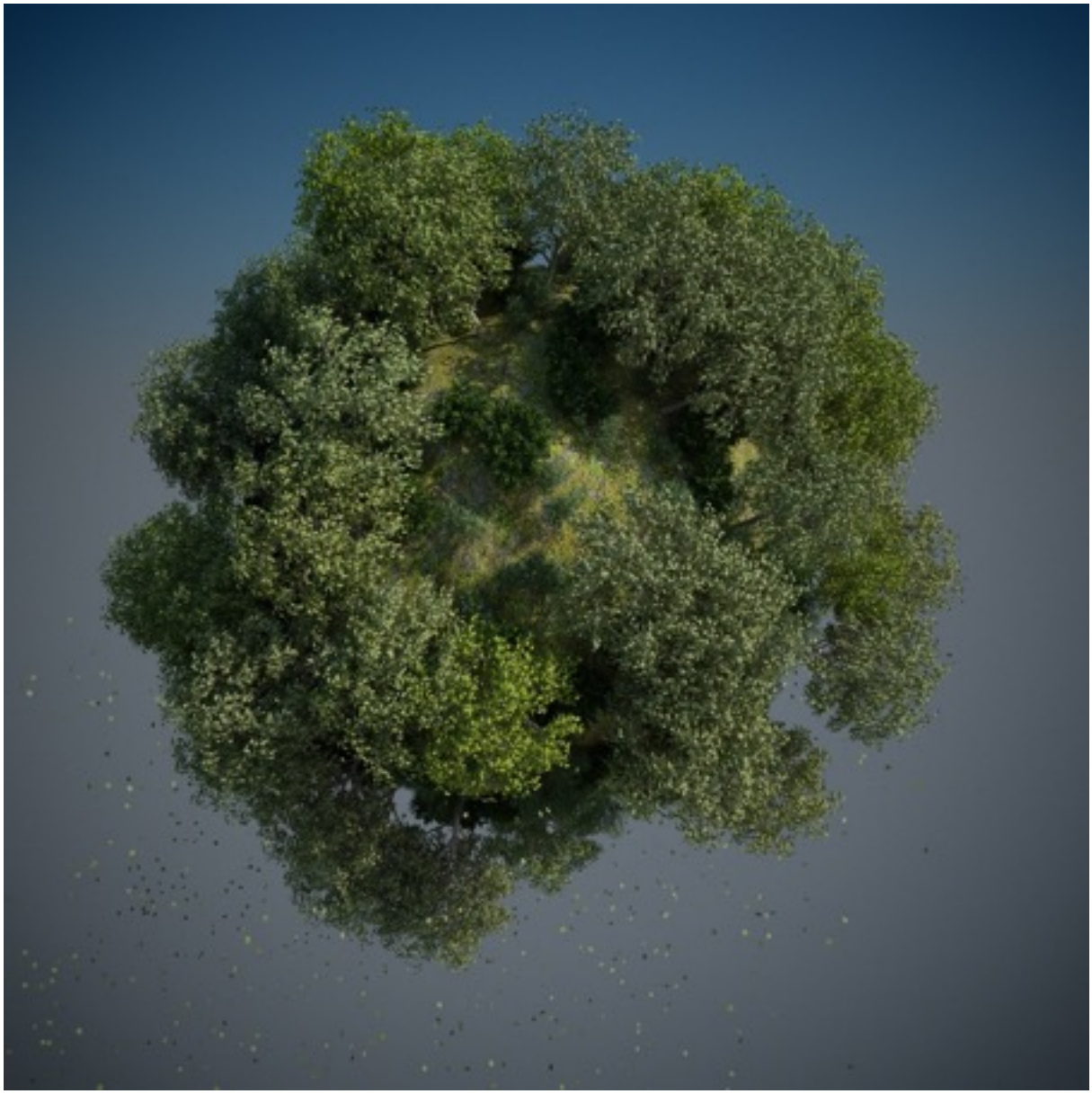
1.2.1. Installation of the Plug-in

Unpack the plug-in ZIP archive into the plug-in directory of your Cinema 4D installation or Cinema 4D demo. For example: "`C:\Program Files\MAXON\Cinema 4D R11\plugins`". Ensure that the directory structure is maintained when unpacking the ZIP archive.

1.2.2. Installation of the license file

Copy the file "surfacespread.lic" into the SurfaceSPREAD directory (e.g., "`C:\Program Files\MAXON\Cinema 4D R11\plugins\SurfaceSPREAD`"). When you start Cinema 4D the next time, the SurfaceSPREAD components will be available.

If you use Cinema 4D R11.5 or higher, you can alternatively put the license file into your User Folder. You can easily find your User Folder by opening the Cinema 4D preferences, page "Common," and clicking the button "Open Folder."



"Tree Planet" by www.c4d-jack.de. Rendered with VRAYforC4D and Vray Proxy objects.

1.3. Components

SurfaceSPREAD consists of the following components:

1.3.1. SurfaceSPREAD Object

The SurfaceSPREAD Object is the heart of the plug-in. It duplicates and distributes any 3D model (input object) onto landscapes and other surfaces. The SurfaceSPREAD Object offers a wide selection of straightforward parameters that can influence the distribution, alignment, scaling, and display of the clone objects (clones), as well as maximize the overall speed and performance of the software.

SurfaceSPREAD uses a specially developed filter system to control the distribution of the clones. Among those filters, you will find standards like polygon selection and vertex map, plus custom geological filters that control the distribution by taking the surface's topology into consideration.

Additional filters manipulate the alignment of the clones on the surface, allowing the user to move, rotate, or scale them. Or to display them in a different way.

Last but not least, there are filters designed to increase performance and lower memory usage by controlling clone distribution according to camera position.

All filters can be combined with each other for maximum effect.

1.3.1.1. Distribution Modifier

The Distribution Modifier is used together with the SurfaceSPREAD Object and manipulates the clones' distribution on the surface, allowing you to create a clearance in a forest or a path through a meadow with minimum effort.

1.3.1.2. Scale Modifier

The Scale Modifier is also used together with the SurfaceSPREAD Object and enables you to change the clones' scaling on a local basis.

1.3.1.3. Distribution Override Tag

The Distribution Override Tag offers the possibility to change the distribution of the clones at a specific clone object level. Just attach it to one or more objects that you want to clone with SurfaceSPREAD, and override any distribution setting with different values that will only be applied to clones of that particular object.

1.3.2. SPREADscape Object

The SPREADscape Object is SurfaceSPREAD's own landscape generator. Alpine panorama, smooth meadows, prairie, rivers, lakes or roads—the SPREADscape Object enables you to create terrains with a million polygons in just a few seconds. You can design almost any style of easily modifiable landscape.

SPREADscape utilizes a special layer system. Build your terrain from up to seven layers, each layer adding more detail or characteristics to the landscape. For every layer, you can use different fractal functions, or design your landscape using bitmaps/shaders or splines.

1.3.3. SPREADrock Object

The SPREADrock Object is an additional object that creates a parametric rock or stone. With a few parameters, you can create an almost infinite amount of different rocks, which can, of course, be cloned using the SurfaceSPREAD Object. If you are creative, you can use SPREADrock for entirely different purposes: With some keyframes and the right material, even explosions are possible.

1.3.4. Wire Object

The Wire Object is a little bonus, useful for everyday modeling and animation. It simply creates a spline along any number of sub objects. That way, you can, e.g., clone Null Objects on a surface, using SurfaceSPREAD, and together with the Wire Object and a SweepNURBS, cocoon an object with strings or wire.

1.3.5. SurfaceSPREAD Shaders

SurfaceSPREAD comes with several channel shaders that can be used in any material channel of the Cinema 4D standard material, or in other materials that utilize channel shaders. Of course, you can also combine them with other shaders, using a Layer Shader or a Fusion Shader. The shader even works with special material of VrayForC4D.

1.3.6. SurfaceSPREAD Data Node

This XPresso node gives you access to the clones' data, opening up new possibilities. For example, you can combine SurfaceSPREAD with ThinkingParticles.

1.3.7. SurfaceSPREAD Commands

Three commands in the plugins menu let you switch on or off all SurfaceSPREAD objects in your scene simultaneously, making work a lot easier.

2. Parameters in Detail

This chapter explains each and every parameter of all SurfaceSPREAD components. Use it as a reference if you want to know more about a certain element in the Attribute Manager.

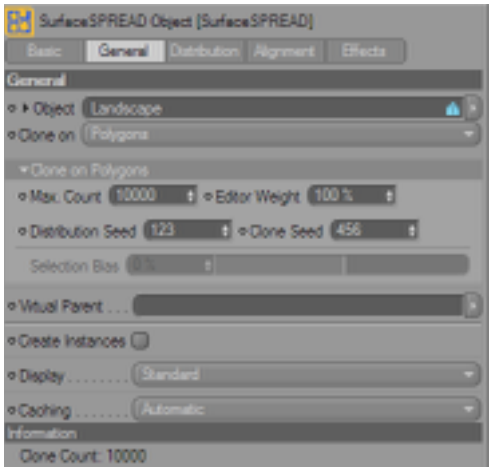
2.1. SurfaceSPREAD Object

Use the SurfaceSPREAD Object to distribute any number of clones on a surface. This is called cloning. The SurfaceSPREAD Object is the first choice if you want to distribute trees, shrubs or rocks in a landscape, put bubbles on boiling milk, or create a crowd of people.

The SurfaceSPREAD Object works with a filter system based in weightings to determine at which positions on the surface clones will be created. The weighting of each clone determines the probability that it will be created. If you read the phrase "the clones' weighting is reduced" in this manual, this means, that in the end, fewer clones will be created. This is because a lower weighting reduces the clone's probability of being created.

2.1.1. General

This tab holds the basic settings.



2.1.1.1. Object

Link an object here, on whose surface you want to create the clones. You can use a normal polygon object here, as well as SPREADscape, standard landscape objects, relief objects, HyperNURBS, primitives, such as: plane, sphere, cube, platonic, disc, pyramid and capsule. The linked object can be animated, e.g., using deformers.

2.1.1.2. Clone on

The default setting "Polygons" produces a distribution of the clones on random positions on the surface of the linked object.

Set this parameter to "Polygons (Centered)" to create a clone on each polygon's center.

Attention: This can produce a large number of clones, making Cinema 4D react slowly (or not at all) until all clones are generated. You should be especially cautious using this function on 32-bit machines.

2.1.1.3. Max. Count

Defines the maximum amount of clones. If you don't use any filters, you will get exactly this number of clones. In practice, the amount of clones created is usually greatly reduced by the filters. This parameter only applies when Clone On is set to "Polygons."

2.1.1.4. Editor Weight

With this parameter, you can reduce the amount of clones displayed in the editor in order to improve performance. It decreases the clones' weighting, and not directly the amount of clones. Therefore, a value of 50% does not reduce the amount of clones by exactly 50%, but a bit more or less.

2.1.1.5. Distribution Seed

This is the random seed for the distribution. This value changes the positions where clones will appear, and therefore may change the result of filters. Generally, this parameter is meant to achieve different in distribution results without having to change any additional parameters.

2.1.1.6. Clone Seed

This random seed does not influence the distribution/positioning of clones, but changes the selection of the original objects. In other words, if you are cloning multiple objects, which child object gets cloned will depend on this value.

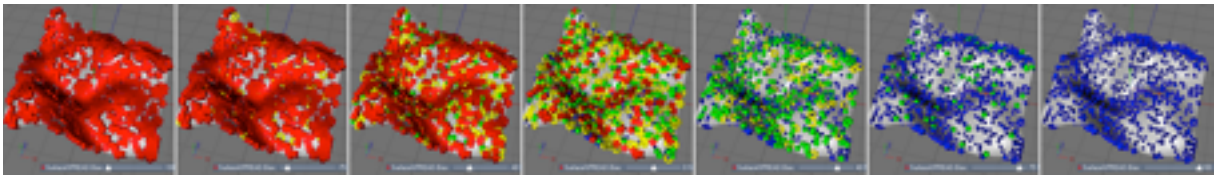
2.1.1.7. Selection Bias

If you have multiple child objects to create clones from, this parameter is available. It dictates if SurfaceSPREAD should pick objects for cloning that are towards the top of the child hierarchy, or more on the bottom.

For example: Assign some cacti to the top of the child hierarchy and some rocks at the bottom. You can now use this parameter to control the ratio between cacti and rocks. The following image sequence shows different results, while only changing the Selection Bias. The total amount of clones is the same in each picture.

2.1.1.8. Virtual Parent

SurfaceSPREAD puts all created clones into a virtual hierarchy. This hierarchy becomes visible if you convert the SurfaceSPREAD Object by pressing the "c" key. All clones now appear as children of a Null Object. If you want to use another object, instead of the Null, link it as Virtual Parent.



You can clone sphere objects and link a Metaball Object as Virtual Parent to cover the surface with thick metaballs (this is not a bad idea for creating snow lying on the landscape). You can also clone Null Objects and link a SurfaceSPREAD Wire Object here, to get instant spaghetti, hair balls or cable tangle.

2.1.1.9. Create Instances

If you convert the SurfaceSPREAD Object by pressing the "c" key, you can see that all clones are exact copies of their original objects. If you would rather create instance objects, which are linked to the original objects—e.g., to make later editing easier, enable this option.

If you use Cinema 4D R11.5, you can select if you want to use normal instances or render instances. Render instances let you render huge amounts of polygons, even if you computer doesn't have much memory.

2.1.1.10. Display

If you have created a very large amount of clones, the editor performance may decrease. In this case, you can switch to a bounding box display, either shaded or as wireframe. The wireframe mode gives the best performance. When rendering, all clones appear normal, of course.

3. Caching

Caching produces a significant performance increase, especially in the editor. Caching prevents the SurfaceSPREAD Object from constantly recalculating its clones. This enables you to work fluently in the editor, even if you have generated thousands of clones. The caching comes in three modes:

- **Off**
  No caching is being used. SurfaceSPREAD recalculates its clones every time it is called by Cinema 4D (e.g., when touching the pivot with the mouse, or clicking somewhere in the viewport, as well as in every frame of an animation). This is the slowest, but also the safest setting to assure that relevant changes on the scene or objects won't be missed.
- **Always**
  SurfaceSPREAD only recalculates the clones, if parameters of the SurfaceSPREAD Object have changed. All other events, even relevant changes on the scene or objects, will be ignored. This is the fastest settings, but it is not safe.
- **Automatic**
  SurfaceSPREAD decides whether its clones have to be recalculated or not. Recalculation will be performed if parameters of the SurfaceSPREAD Object have changed, or if participating objects (original objects, modifiers, target objects, etc.) have been moved or changed, or if the camera has moved while SurfaceSPREAD performance filters are active. This setting offers good performance and is likely to be used most.

3.1.1.12. Time Offset

With this feature, you can offset the animation of clones by a random amount of time. Imagine you have created a crowd of waving people. Using the Time Offset, you can make them wave asynchronously, which look much more realistic.

Please note that the Time Offset will not work with instances or render instances, since those are always exact copies of their original objects. Just create some copies of your original objects and make them children of the SurfaceSPREAD Object, too. That will help give the animation some randomness.

Another restriction of the Time Offset is that it will only work with keyframe-based animation, but not with animation based on expression tags (XPresso, IK, constraints, etc). Cinema 4D can only offset keyframe animation.

Time Offset (sec.)

This parameter defines the maximum amount of time by which the animation of clones may be offset.

Seed

Use this value to vary the random time offset.

3.1.1.13. Information

This section displays the total count of clones created.

"Penguins" by Knut Schröder.

3.1.2. Distribution

In this tab you will find the SurfaceSPREAD filter system. It offers a multitude of different filters to control the distribution of clones. The filters are arranged in three groups: Standard Filters, Geo Filters, and Performance Filters.

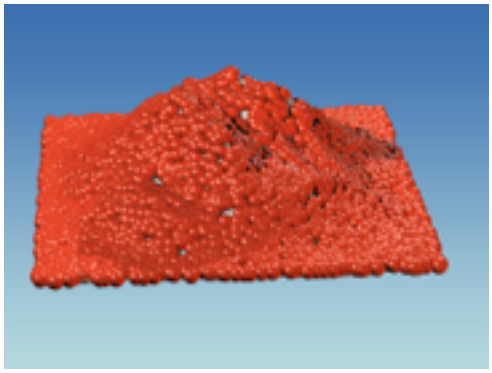
Standard Filters allow the restriction of clones with traditional functions like polygon selections, vertex maps, and material color, but also with Modifier Objects and minimum distance between the clones.

Geo Filters change the distribution of clones according to rules taken from the real world, such as the surface topology of the linked geometry object. Here you can constrain the clones to certain altitudes or slope levels, or apply a natural fractal distribution.

Performance Filters don't add to the look of the scene, but improve the memory usage, editor performance, and preparation time for rendering. Here you can filter clones that are outside the camera's field of view, behind mountains, or very far away from the camera.

All filters from all groups can be combined with each other.

It is important to understand that filters do not eliminate existing clones, but prevent them from being generated in the first place. Therefore, all filters always improve performance and memory usage.



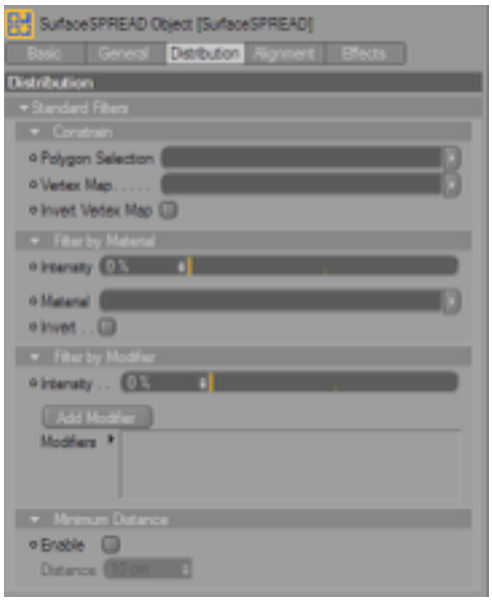
Several hundred clones in standard distribution. No filters are active.

"The Valley" by Markus Schnell. Rendered with FryRender.

4. Standard Filters

Constrain

Here you find standard filters, as found in most other cloner objects or plug-ins.

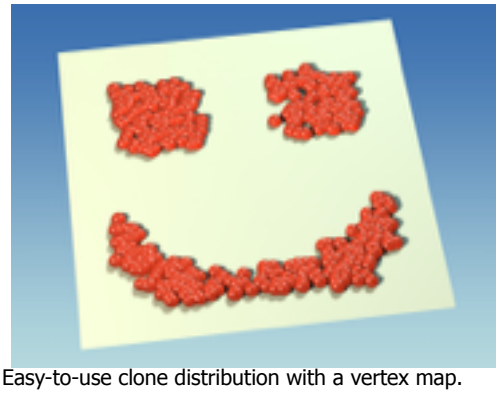


Polygon Selection

Link a polygon selection (Selection Tag) here to let clones only appear on the selected polygons. Polygon selections only allow hard constraining of clones, so there is no way to control the distribution density.

Vertex Map

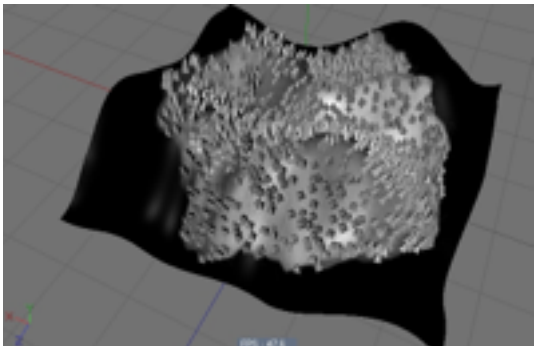
Link a vertex map (Vertex Map Tag) here to selectively control the clone density. You can create a vertex map with the tool "Live Selection" or using the Paint Tool that comes with the Mocca module. The value of a point in the vertex map directly applies to the clones' weighting: The higher the value is, the more clones will be created on the polygons neighboring the point. Using the "Invert" checkbox, you can invert the vertex map's effect.



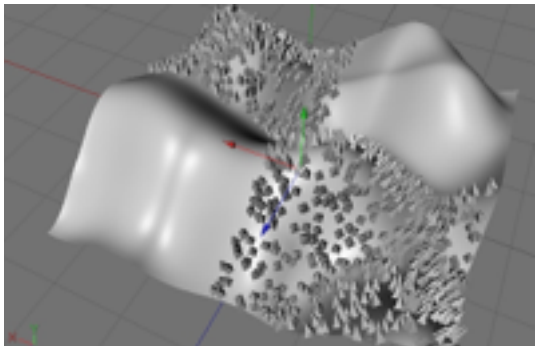
Easy-to-use clone distribution with a vertex map.

Filter by Material

Here you can link a material to control the clone density. The material's color channel is evaluated. In the channel, you can use shaders as well as bitmap textures. SurfaceSPREAD will always use UVW mapping when evaluating the material. You can control the intensity of the filter, and also invert it.



Material distribution with a bitmap.



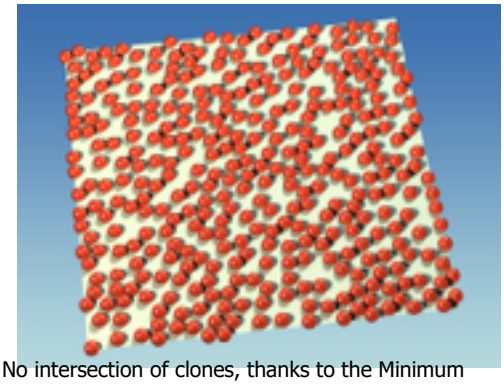
Material distribution with a checkerboard shader.

Filter by Modifier

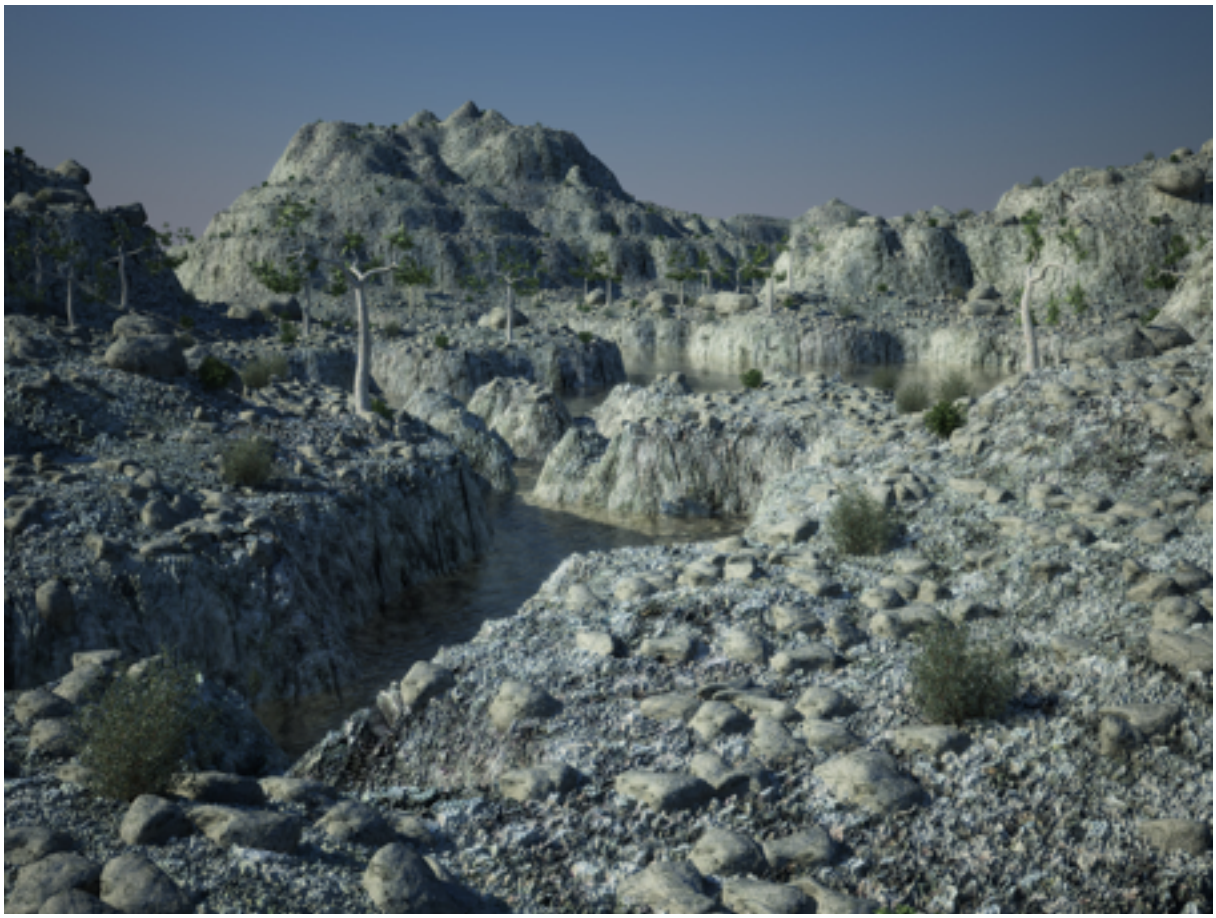
In this filter you can link any number of Distribution Modifier Objects, which you can freely place in your scene. Clones within a modifier's radius will be filtered according to the modifier's parameters. That way you can easily create clearances in your forest. The total intensity of all modifiers can be set in the filter, all other parameters can be found in the Distribution Modifier Object. By linking a spline into the Distribution Modifier Object, you can easily create paths through a meadow or keep your roads clear of trees.

Minimum Distance

This filter is extremely useful if clones are intersecting each other, or are overcrowding in certain areas of the surface geometry. Set a minimum distance, and all clones that are located nearer to each other than this value will be filtered.



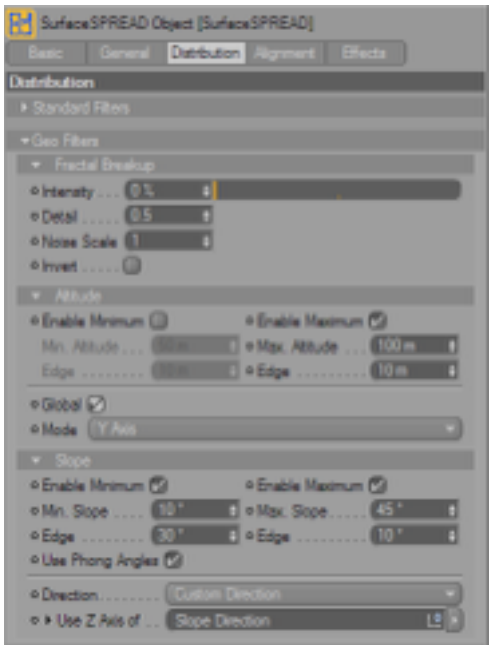
No intersection of clones, thanks to the Minimum Distance filter.



"Landscape" by www.c4d-jack.de. Rendered with VrayForC4D and Vray Proxy objects.

5. Geo Filters

Fractal Breakup



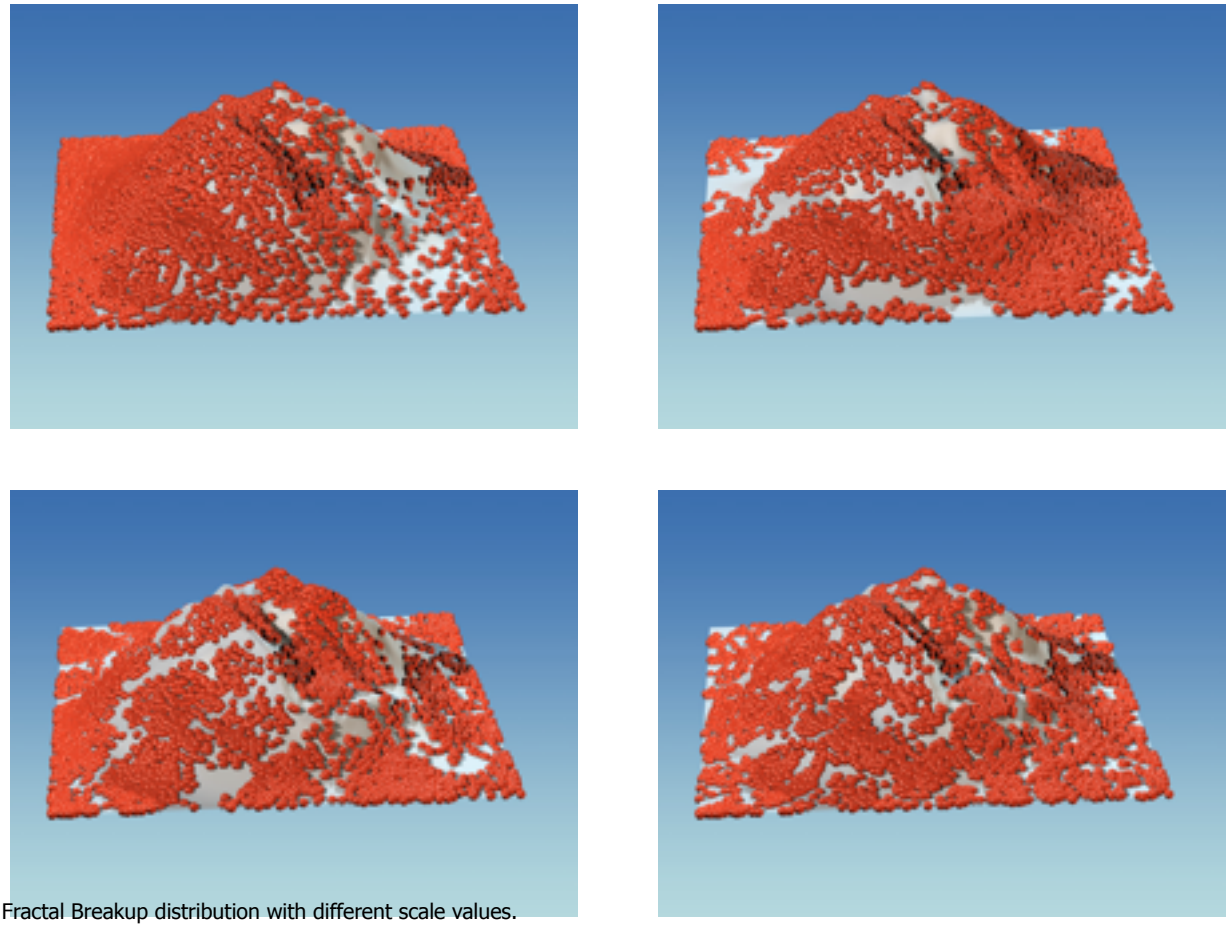
In nature, objects like stones, trees and flowers are not distributed with uniform density and occurrence. There is always a natural variation. This variation can be simulated with the Fractal Breakup filter.

Fractal Breakup filters clones using a turbulence function, producing a natural looking variation of the distribution density. The turbulence function relates to the clones' position in space (local space of the surface geometry) to create a continuous fractal pattern. Because of this, changes in the geometry (caused e.g., by animated deformers) will affect the distribution.

Intensity
Controls the filter's intensity. Higher values will cause more clones to disappear.

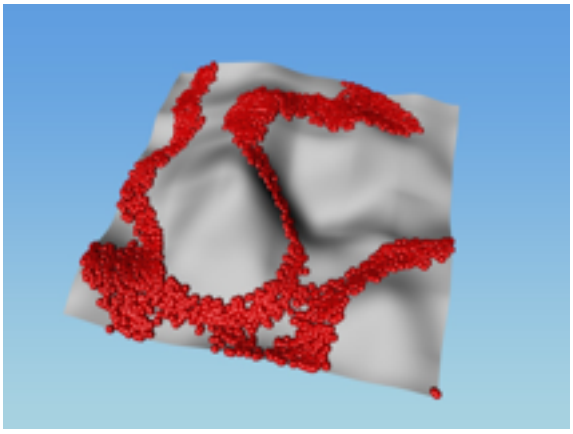
Detail
This parameter works like the Octaves value of a noise shader. Higher values produce more and finer variation. Very high values can cause a decrease in performance. Suitable values are mostly between 1 and 5, but may depend from the landscape's dimensions.

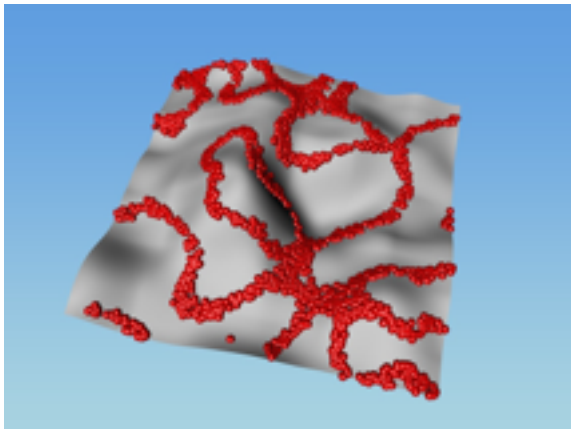
Noise Scale
The scale of the turbulence field. Very low values produce clearly visible patterns, while higher values give seemingly chaotic results. The more clones you have, the more distinguishable the pattern will look.



Fractal Breakup distribution with different scale values.

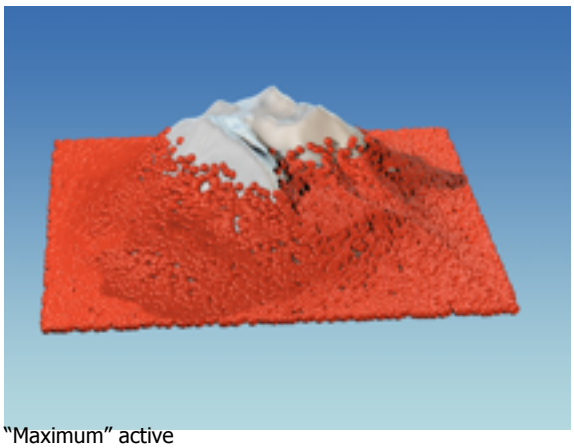
Invert
Activating this option will invert the effect of the filter. Normally, the filter creates a sort of "veins" where no clones are created. With this option activated, clones only appear on the veins.



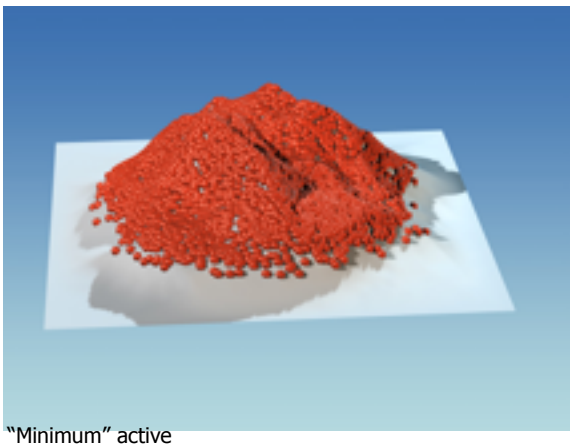


Altitude

With this filter, you can constrain above or below (or both) a certain altitude level. An example of the maximum altitude would be the tree limit as it can be seen in the mountains, where trees only grow below a certain altitude. Above that height will possibly be more bushes or rocks. This phenomenon can easily be simulated with the Altitude filter.



"Maximum" active



"Minimum" active

Enable Minimum / Enable Maximum
Activates the respective filter function. Of course, both functions can be active at the same time.

Min. Altitude
If the Minimum option is activated, all clones below this altitude will be filtered.

Max. Altitude
If the Maximum option is activated, all clones above this altitude will be filtered.

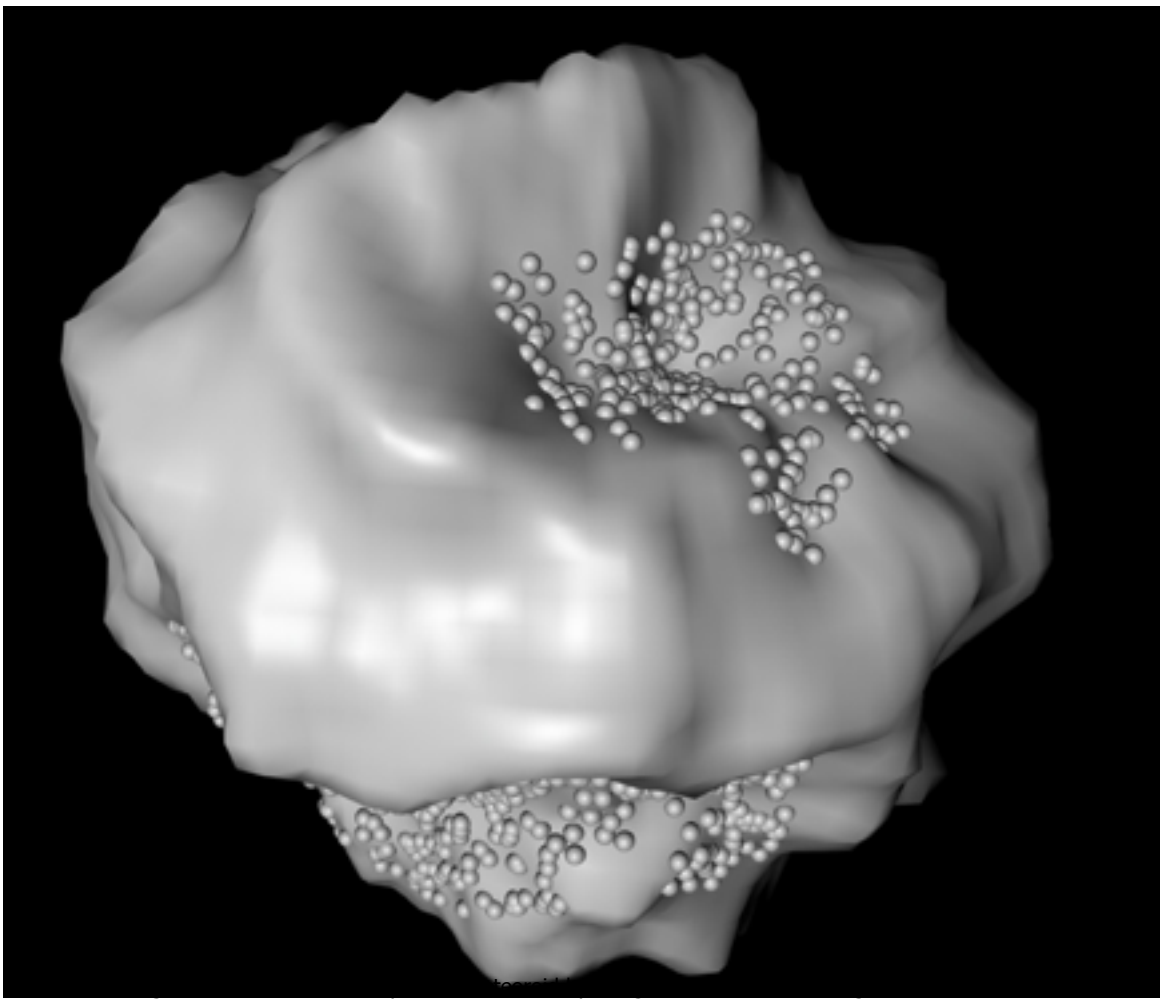
Edge
Controls the rate at which the clone's weighting is reduced above or below the Min. and Max. altitudes, respectively. This produces are more realistic result, since it prevents a hard border.

Global

By default, the Altitude Filter references the local coordinate system of the surface geometry. Activate this option to reference the filter to the global coordinate system. This is very useful if you have several landscape objects (or SPREADscape objects) at different height levels, and want to distribute the clones consistently over all surfaces.

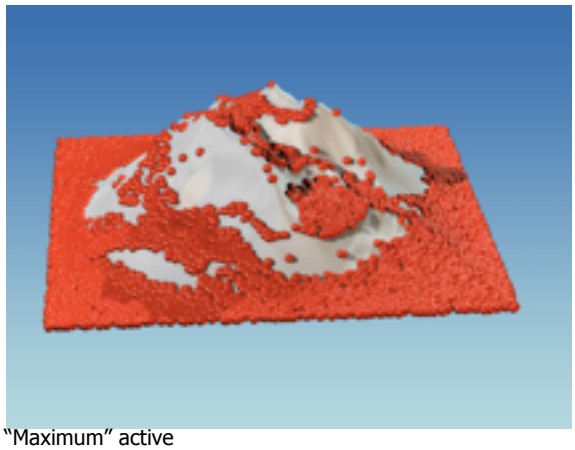
Mode

Generally the Y-axis points upwards, so it can be regarded as the "height axis." If required, you can select another direction here. The "Distance from Origin" is especially interesting because it does not produce a linear, but rather, a spherical behavior; so you can even use the Altitude Filter for mountains on a whole planet.

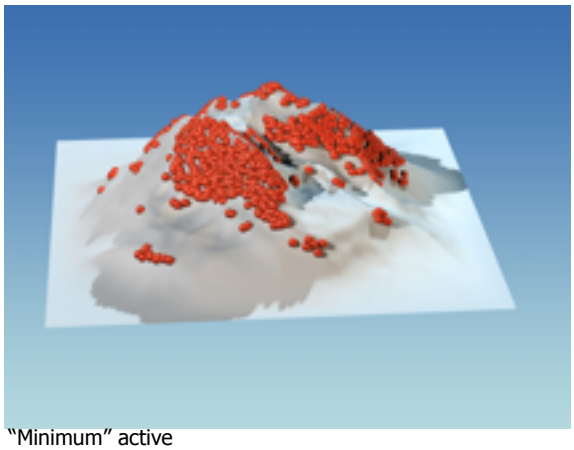


Slope

The Slope Filter is another method for creating realistic object distribution on landscapes. It constrains the clones depending from the terrain's decline. For example: Rocks can not lie on very steep slopes, because in reality they would roll down. Trees, however, can root on relatively steep slopes. And there may be some bushes that can grow on even steeper slopes, but are not found on flat plains. All of these criteria can be easily addressed with the Slope Filter.



"Maximum" active



"Minimum" active

Enable Minimum / Enable Maximum

Enables the respective filter function. As with the Altitude Filter, both functions can be active at the same time.

Min. Slope / Max. Slope

Use these parameters to set the desired threshold for the steepness of slopes of the terrain.

Edge

As with the Altitude Filter, an area can be defined in which the clones' density is continuously reduced to prevent a hard border, producing a more realistic result.

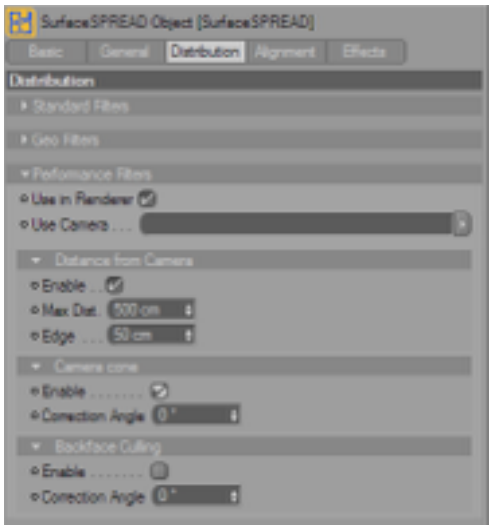
Use Phong Angles

By default, the polygon normals are evaluated to determine the slope angle. The results get a bit finer when you active this option. Of course, a Phong Tag must be present on the surface geometry for this to work. If the surface geometry does not have a phong tag attached, this option does nothing.

Direction / Use Z axis of

By default, the surface geometry's Y-axis is used to measure the steepness of the surface. If the direction is set to "Custom Direction," you can link a Null Object whose Z-will then be used. That way you can intuitively distribute more trees on the sunny side of a mountain, or moss on a tree's wetter side.

5.1.1.3. Performance Filters



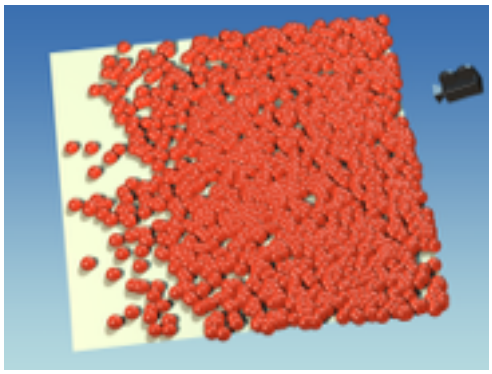
The filters in this section are not used to achieve a nicer image or a more realistic distribution. They serve to reduce the memory usage and may increase editor and rendering performance by filtering clones in areas where they are not needed.

Use in Renderer
If this option is activated, performance filters will also be applied when rendering. If it's deactivated, all performance filters will be skipped by the renderer.

Use Camera
All performance filters depend on the camera in some way. By default, the active scene camera is used (if there's no active scene camera, the editor camera is used). Either way, it is always the camera you're currently looking through.

If you do not want it to switch, you can link a camera object here. All performance filters will then refer to the linked camera, regardless of that camera being active or not.

Distance from Camera



This filter reduces the clone density with increasing distance from the camera. This is especially useful for big landscapes: While having rocks closely-packed in the foreground, it may be sufficient to have one rock every 20 meters for the background. The viewer will mostly not recognize the difference.

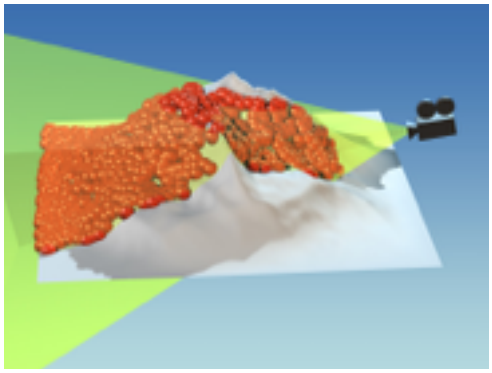
The drawback is that this filter controls the clone distribution where the clones are seen by the camera. In animations, appearing or disappearing clones can occur, thus making this filter more suitable for still images.

Min. Dist
Clones will be created only past this distance.

Max. Dist
No clones will be created past this distance.

Edge
As it is the case with other filters (e.g., Altitude and Slope), this value prevents a hard border. For example: "Max. Dist" is 500m, "Edge" is 100m. The clones will now be distributed with normal density from the camera until 400m distance. Over the next 100m the density will decrease, and starting from 500m distance, there will be no more clones.

Camera Cone



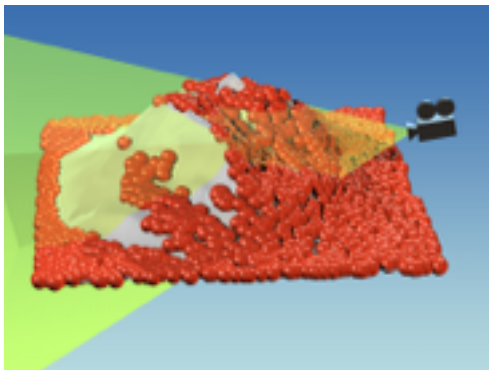
This filter is very handy and often produces a great performance gain. It simply filters all clones that are outside the camera's field of view. For this, zoom/FOV, as well as global position and alignment of the camera, are evaluated.

Pro tip: This filter only operates in areas that are not seen by the camera, so there's no risk of seeing any clones disappearing or popping up in an animation. But be careful: Such irregularities may still be visable in reflecting or refracting surfaces. Additionally, clones outside the field of view may cast shadows into the visible area, thus revealing disappearing clones. If this happens, you should experiment with the correction angle.

Correction Angle

If you see clones disappearing at the image border, you should increase this value. This makes the camera cone being considered for culling objects slightly bigger. As a result, objects that are just slightly outside the real camera cone are kept in the scene.

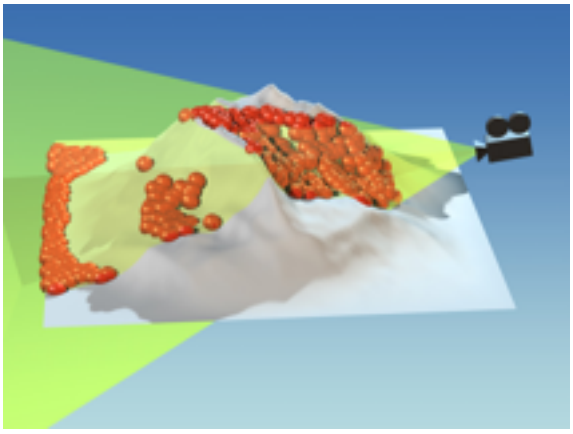
Backface Culling



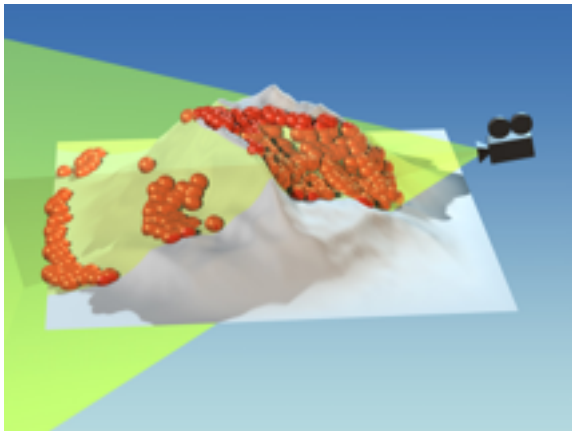
Another useful filter, it removes all clones that are created on polygons that don't face the camera. In other words: If you look at a mountain with rocks, the rocks will only be created on the side of the mountain that you're looking at. Again, with an appropriate correction angle, this filter only operates in areas that are not seen by the camera.

Correction Angle

This filter can also product side effects like trees that disappear behind knolls if the camera goes too deep. To prevent this, increase this value.



Combination of Backface Culling and Camera Cone filters.



Combination of Backface Culling, Camera Cone and Distance from Camera filters.

As you can see in these images, the application of performance filters can greatly reduce the amount of clones required, without making a significant difference in the rendered image. This significantly reduces the memory usage, especially with clones that contain many polygons.

5.1.3. Alignment

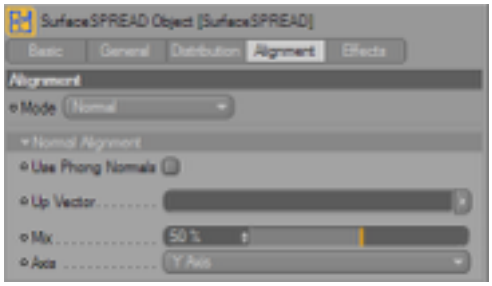
The parameters in this tab are used to control the alignment of the created clones.

Mode
Here you can choose from the following modes:

- **None (Position only)**
  The clones are not rotated in any way, so they simply inherit the alignment of the original objects they have been cloned from.
- **Normal**
  The clones are aligned along the polygon normal with their Z-axis. Please note: Z-axis! Trees have to point along their local Z-axis (Simply put them into a Null Object that is properly rotated).
- **Target**
  All clones will point their Z-axis to a target object.
- **Static**
  All clones are being aligned according to a static vector.

5.1.3.1. Normal alignment

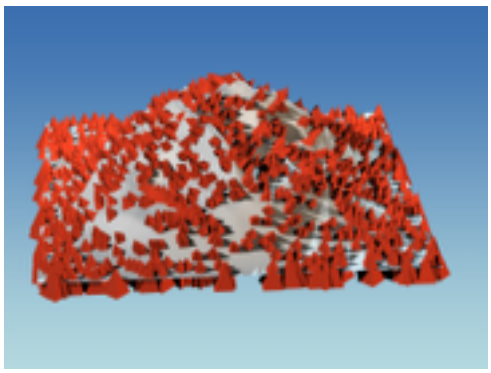
This parameter group is only visible in "Normal" mode.



Use Phong Normals
When this option is activated, the clones will be aligned along the surface geometry's phong normals. If the geometry does not have a phong tag, or if this option is deactivated, the polygon normals will be used.

Up Vector
By default, SurfaceSPREAD picks an Up Vector for each clone automatically, to ensure a stable normal alignment. If you want to define an Up Vector yourself, link an object here. The Y-axis of each clone will then point to this object.

Mix
With this slider, you can change the normal alignment by mixing the direction, along which the clones' Z-axis is aligned, with another direction. That second direction can be defined with the Axis parameter.



This option is especially useful for forests on mountainous landscapes. You can align all trees to the terrain's polygons normal and then use the Mix slider to "bend" the trees back into the +Y direction until they point almost straight up. This way, you get a realistic forest with trees pointing up imperfectly, yet still influenced by the terrain's topology.

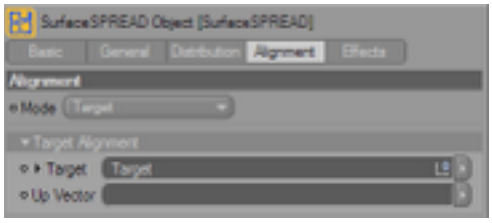
Axis
Here you select the direction (using global coordinate system) towards which you can to point the clones' Z-axis. The Mix slider will then blend between the surface normal and the selected direction.

There are several options available:

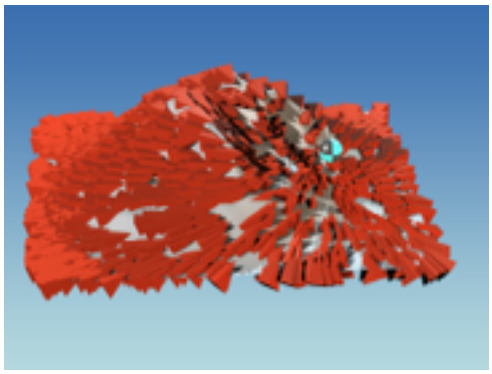
- **X-Axis, Y-Axis, Z-Axis**
  Uses one of these axis as direction. The setting "Y-Axis" makes sense if you want to plant trees on a landscape.
- **Spherical**
  Uses the direction from the surface geometry's origin to the clone's position. Thinking of the tree example, you could use this option if you want to plant trees on a whole planet (e.g., a spherical landscape object).
- **Custom Direction**
  When this option is selected you can define a custom direction vector.

5.1.3.2. Target Alignment

This parameter group is only visible in "Target" mode.



At first view, the target alignment does not seem to make much sense for landscape scenes, but it has several uses. If you want to distribute a huge amount of objects (e.g., trees) in the background of a scene, it is advisable to use sprites. Sprites are simple planes (1 polygon) with an alpha image of the tree mapped on it. These planes have to be facing the camera, of course, and that is where this alignment mode comes in handy.

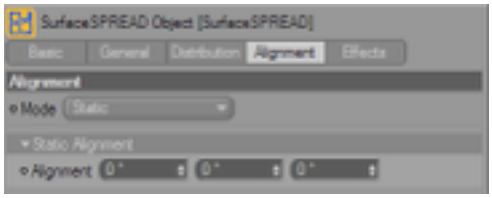


Target
Link an object here. The clones will target to this object with their Z-axis.

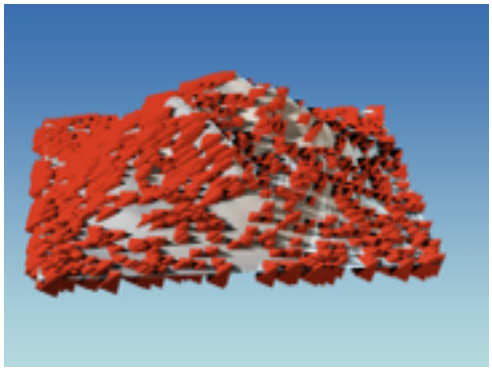
Up Vector
Optional. If you link an object here, the clones' Y-axis will target it. Use this to stabilize the clones' alignment, if necessary.

5.1.3.3. Static Alignment

This parameter group is only visible in "Static" mode.



Alignment
This vector defines the HPB alignment for all clones.



5.1.4. Effects

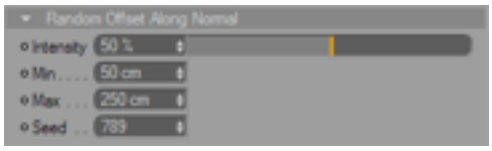
This tab offers a multitude of possibilities to influence the created clones.

5.1.4.1. Static Offset

Use to move your clones from their original position on the surface. The translation can either be applied along the X-, Y- and Z-axis using a vector, or along the surface normal using a single value. The latter is especially useful to control how deep the clones penetrate the surface.

5.1.4.2. Random Offset Along Normal

With this effect, the clones can be offset along the surface normal by a random value.



Intensity
Intensity of the effect.

Min / Max
The minimum and maximum offset.

Seed
The seed of the random calculation. Use it to create an almost infinite number of variations.

5.1.4.3. Offset by material

This effect offsets clones along the surface normal by the brightness of a linked material's color channel. This is especially useful when applying displacement to the surface geometry.

Height
The maximum offset of the clones.

Material
Link a material here that should be used.

5.1.4.4. Random Alignment

Random variation of the clones' alignment. One of the most important effects for creating a realistic look.

Intensity
Intensity of the effect.

Max
The maximum angle by which the clones are rotated from their standard alignment (which is defined by the settings in the Alignment tab).

Seed
The seed of the random calculation.

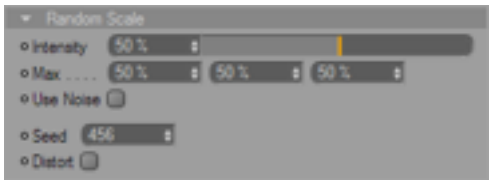
6. Base Scale

The clones' scaling. You can quickly scale all clones without touching the original objects.

Scale
(top) The clones' scaling by the X-, Y- and Z-axis together.

(bottom, left-right) The clones' scaling by the X-, Y- and Z-axis separately.

6.1.1.6. Random Scale

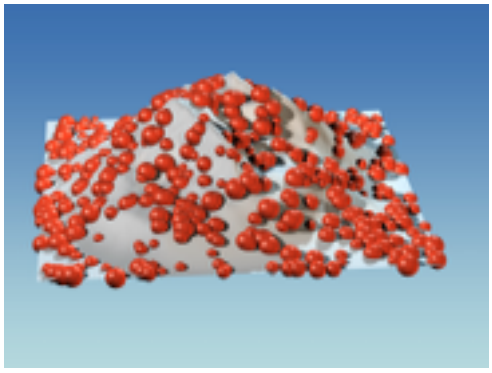


Random variation of the clones' scaling.

Intensity
The intensity of the effect. At 0%, all clones are scaled the same (Base Scale).

Max
Here you define the maximum variance of the scaling.

Use Noise
By default, a simple random generator is used for the Random Scale effect. Activate this option to get a rather structured-looking randomness, with closely-located objects having similar values.



Seed
This parameter is only visible if "Use Noise" is deactivated. It is used to create an almost infinite amount of variations.

Distort
By default, the same random scale value is applied to all three axes of the clones. If you activate this option, a different random value will be used for each axis, thus distorting the clones. This parameter is only visible if "Use Noise" is deactivated.

Noise Scale
This parameter is only visible if "Use Noise" is activated. Defines the scaling for the noise structure.

Noise Variation
Varies the noise structure, enabling you to create almost infinite variations. If animated, it also creates very interesting results.

6.1.1.7. Scale by Vertex Map

If you want to control the clones' scaling on a local basis, use this effect. Link a vertex map here and turn up the intensity.

Intensity
The effect's intensity.

Vertex Map
Link the vertex map here that should be used for scaling.

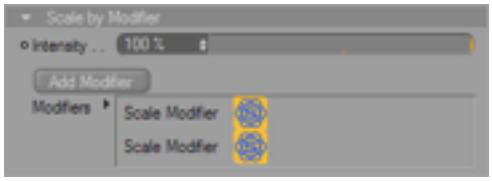
7. Scale by Material

This effect manipulates the scaling according to the brightness values of the color channel of a linked material.

Intensity
Controls the effect's intensity.

Material
Link a material here that should be used for the scaling.

7.1.1.9. Scale by Modifier

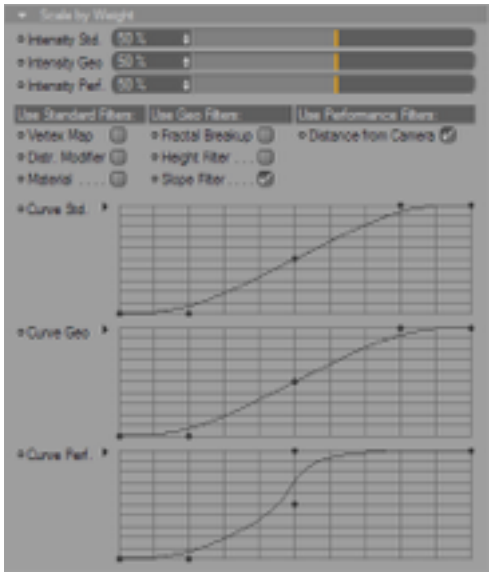


This effect scales the clones dependent on Scale Modifier Objects. If a clone is located within the range of a Modifier Object, it will be scaled. The parameters of the Modifier Object define how the scaling is performed.

Intensity
Overall intensity of the scaling effect.

Modifiers
Link any number of Modifier Objects here.

7.1.1.10. Scale by Weight



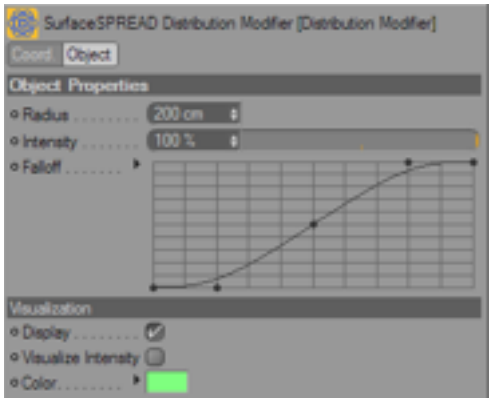
This effect scales the clones on the basis of weightings calculated by the filter system (Distribution tab).

The sliders control the influence of each of the filter groups. The checkboxes define which of the filters should be taken into account at all.

Landscape by Michael Auerbach. Rendered with AR3 and render instances.

7.2. Distribution Modifier

The Distribution Modifier is used in the standard filter "Filter By Modifier" that is located in the Distribution tab of the SurfaceSPREAD Object. Clones that are located in the range of the Modifier Object will be filtered. The probability of a clone being eliminated depends on the distance between clone and modifier, as well as from the settings in the Modifier Object.

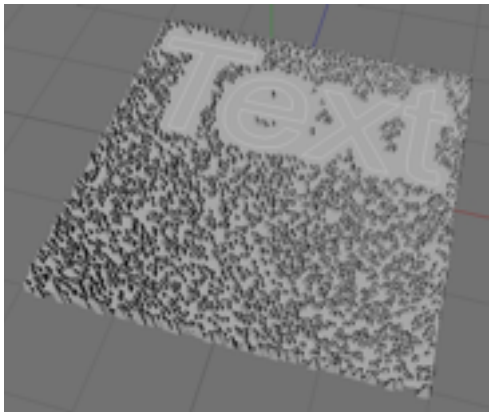


7.2.1. Ignore Y

When this option is enabled, only the distance of clones and modifier on the XZ plane are taken into account. The Y position of the modifier (or a linked spline) will be ignored.

7.2.2. Spline

Here, you can link a spline object. SurfaceSPREAD will create a number of samples along this spline, of which each sample will work as a normal modifier. This way, you can easily create a path through your meadow, or keep your roads tree-free. You can also use segmented splines.



7.2.2.1. Accuracy

This parameter controls the amount of samples that will be calculated along the spline. Lower values offer better performance, while greater values will maintain the shape of the spline more precisely.

7.3. Scale Modifier

The Scale Modifier is used in the effect "Scale by Modifier" in the SurfaceSPREAD Objects. It changes the scaling of the clones that are located within the modifier's range. As always, the effect's intensity depends from the distance between clone and modifier, as well as from the settings in the Modifier Object. Like in the Distribution Modifier, the Scale Modifier can also use splines.

Park by Holger Schömann. Rendered with VrayForC4D and Proxy objects.

7.4. SPREADscape Object

The SPREADscape Object is SurfaceSPREAD's mighty terrain generator. Use it to create anything from soft hilly landscapes to mountains, cliffs, rivers or road scenes, or totally abstract landscapes. All with minimum effort. The SPREADscape object offers far greater capabilities than the Standard Landscape Object found in Cinema 4D.

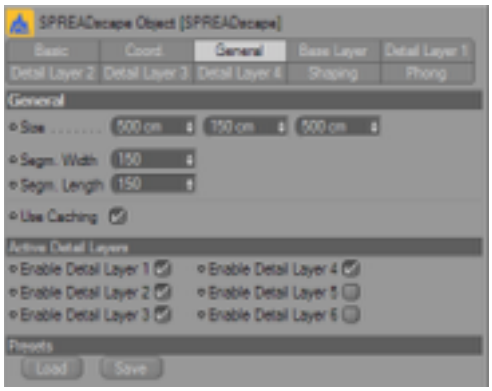
SPREADscape uses a novel layer system, which you may have seen in a slightly different form in other landscape generators or 2D graphics applications. Using the layer system, you build the terrain by stacking up to seven layers, and mixing them with each other.

SPREADscape gives you a base layer, and up to 6 detail layers. Each of these detail layers can receive its contents from one of several fractal functions, a spline, or a material. Mixing the layers with each other is done using different mix modes, which can be separately selected for each layer.

This way, you can, e.g., combine the mountains from the base layer with smaller hills from the detail layers, add a river bed or a road with another detail layer (type "Spline") and add other details. When experimenting with the SPREADscape object, you will get used to this workflow pretty easy.

7.4.1. General

This tab holds basic parameters for the landscape, such as dimensions and subdivision. Furthermore, you control the active detail layers here, as well as load and save preset files.



7.4.1.1. Size

Define the basic dimensions of the landscape here. The final height may differ from the value set here, due to the settings in the detail layers.

7.4.1.2. Segm. Width / Length

Use these values to set the subdivision of the landscape. Higher values produce more detailed terrain, but also increase the time needed for calculation. As a rule of thumb, use as much as necessary, but as little as possible.

7.4.1.3. Use Caching

Generally, this option should stay activated, since it significantly increases the editor performance and shortens the preparation time when rendering an animation. If you deactivate this option, the SPREADscape terrain will be recalculated much more often. This may be useful, e.g., to directly see the effect of changes made to shaders or textures used in a detail layer (type "Material").

Note: When clicking on the "Refresh" button in a detail layer of type "Spline" or "Material," the caching will be activated automatically.

7.4.1.4. Enable Detail Layer (1 - 6)

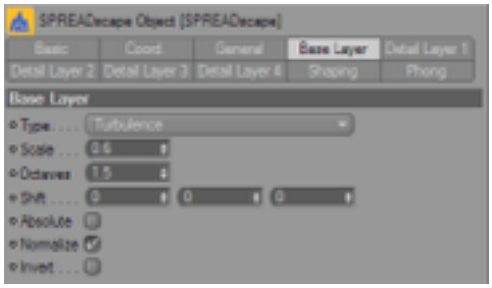
Add the detail layers you need here. Each activated detail layer will appear as a separate tab in the SPREADscape Object's Attribute Manager.

7.4.1.5. Presets: Load / Save

If you have created a really nice landscape, you can save the parameter settings of the SPREADscape Object to a .scape file, and load it later when needed. These buttons open the standard Load/Save dialogs.

8. Base Layer

A SPREADscape terrain always contains at least the base layer. Here you set the fundamental shape of the landscape. Set the parameters in a way that offers a good impression of what the terrain will look like, then add more details in separate detail layers.



8.1.1.1. Type

Select a fractal function that you want to use. You can choose from "Turbulence," "Wavy Turbulence," "Noise," and "Ridged Multifractal."

8.1.1.2. Scale

This parameter scales the fractal function. You can create anything from mountains to pebbles.

8.1.1.3. Octaves

The higher this value, the more detailed the fractal structure will appear. Very high values may decrease performance.

8.1.1.4. Shift

Move the fractal structure along the three axis of the object. Moving it along Y will cause a nice and soft variation.

8.1.1.5. Absolute

This value is only available for the fractal function "Turbulence." It prevents the function from returning negative values. In practice, it makes the structure look more "knobbed."

8.1.1.6. Normalize

This option is available for all fractal functions except "Ridged Multifractal." SPREADscape will try to scale the landscape to the height (set in General tab) as closely as possible. However, there my be some minor bumps and jumps when moving the structure with the Shift parameter. If you don't like that, deactivate this option.

8.1.1.7. Invert

Inverts the structure in Y direction. Especially useful for the fractal function "Ridged Multifractal." This way, you can create either mountains with canyons, or a plain with ridges.

Rocky landscape made from SPREADrock and SPREADscape objects.

9. Detail Layer (1 – 6)

Here you have up to six detail layers that can be optionally activated in the General tab. All detail layers offer the exact same functionality.

9.1.1.1. Layer Type

Select the type of the detail layer here. You can choose from the following: "Noise" (Fractal functions), "Spline," and "Material."

9.1.1.2. Blend Mode

As in 2D graphics applications, you can define how the current detail layer is mixed with the underlying layers here. You can choose from the following mix modes:

- **Add**
  The detail layer's content will by added to the underlying layers. This is the standard method to combine several layers with each other.
- **Multiply**
  The underlying layers will be multiplied with the current layer. If the current layer has a low value, all underlying layers will be lowered as well.
- **Lowest**
  The lowest value is used, the higher value will be ignored. Good choice to cut off the top of mountains or to create elevated plains. Experiment with the Offset parameter (2.4.3.4)!
- **Highest**
  The highest value is used, the lower value will be ignored. Perfect for filling valleys and river beds with mud, sand or rubble. Again, experiment with the Offset parameter!
- **Set Spline Height**
  This mode only works the "Spline" type of detail layers. It directly attaches the terrain's surface to the spline, enabling you to create elevations as well as depressions. This is the ideal mix mode for road foundation or dirt tracks. Experiment with the position of the spline points!

9.1.1.3. Height

This parameter controls the intensity of the effect the current detail layer has on the terrain. If the value is 0, the detail layer has no effect.

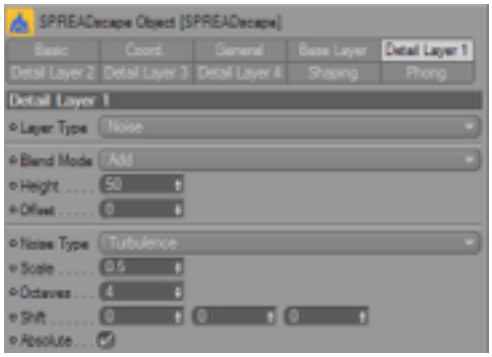
9.1.1.4. Offset

If your landscape gets too high due to some of its settings, you can correct that using this value without losing the effect of the Height parameter.

9.1.1.5. Shaping

At the bottom of each Detail Layer's attributes you will find a parameter group called "Shaping." It provides you with a shaping curve and shaping presets found in the "Shaping" tab. For further information, please read chapter 2.4.7 Shaping.

10.Layer Type “Noise“



These type of Detail Layers are the classic element of a terrain generator. With a few Noise Layers and different settings, you can create an infinite variety of different landscapes with very little work.

This layer type offers the following parameters:

10.1.1.1. Noise Type

Here you can choose from the same fractal functions (Noise types) that are also offered by the base layer: “Turbulence,” “Wavy Turbulence,” “Noise” and “Ridged Multifractal.” Each of these Noise Types has a characteristic look and is suitable for various types of landscapes.

10.1.1.2. Scale

This parameter scales the fractal function. You can create anything from mountains to pebbles.

10.1.1.3. Octaves

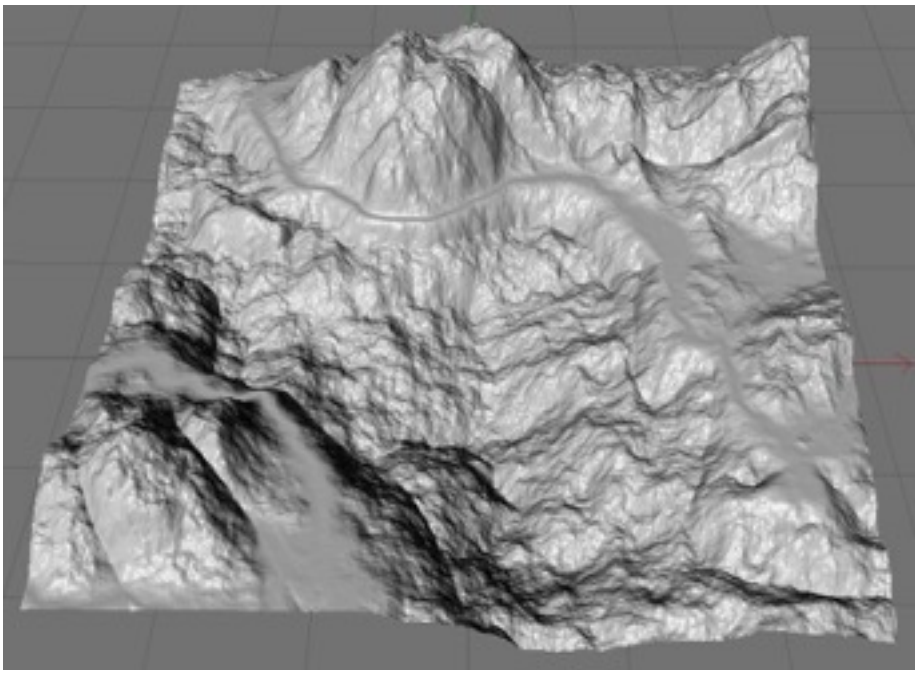
The higher this value is, the more detailed the fractal structure will appear. Very high values may decrease the performance.

10.1.1.4. Shift

Move the fractal structure along the three axis of the object. Moving it along Y will cause a nice and soft variation.

10.1.1.5. Absolute

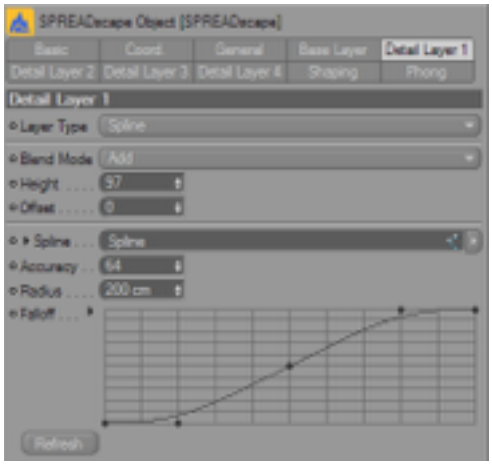
This value is only available for the fractal function “Turbulence.” It prevents the function from returning negative values. In practice, it makes the structure look more “knobbed.”



Terrain with 1.000.000 polygons, made only from noise layers

11.Layer Type “Spline“

If you need a direct influence on the terrain to create things like river beds or road fundaments, or if you want to setup a whole mountain chain, this layer type is for you.



Pro Tip: When using the mix mode “Set Spline Height,” a kind of spline sculpting is especially possible. This layer type was essential for the image “Autumn Road” that you see on the title page of this manual.

This layer type offers the following parameters:

11.1.1.1. Spline

Link a spline object here that you want to use for sculpting. Changes to the splines are recognized by SPREADscape automatically. Of course, you can also use segmented splines (e.g., Text Spline).

11.1.1.2. Accuracy

A spline layer has to sample a number of positions along the linked spline in order to work properly. With this parameter, you control the number of samples that are being recorded. Generally, a greater amount of samples is required if you decrease the radius (see 2.4.5.3) or increase the subdivisions of the SPREADscape Object.

Pro Tip: This parameter is critical for the performance of a spline layer. The higher the value, the more precise the spline will be reproduced on the terrain. Values that are too high will likely cause a significant performance decrease, thus slowing down your workflow. You should check from time to time if you can decrease this value without noticeable quality loss.

11.1.1.3. Radius

The radius around a sampled spline point. In practice, this value defines the width of the river bed or road fundament you’re creating.

11.1.1.4. Falloff

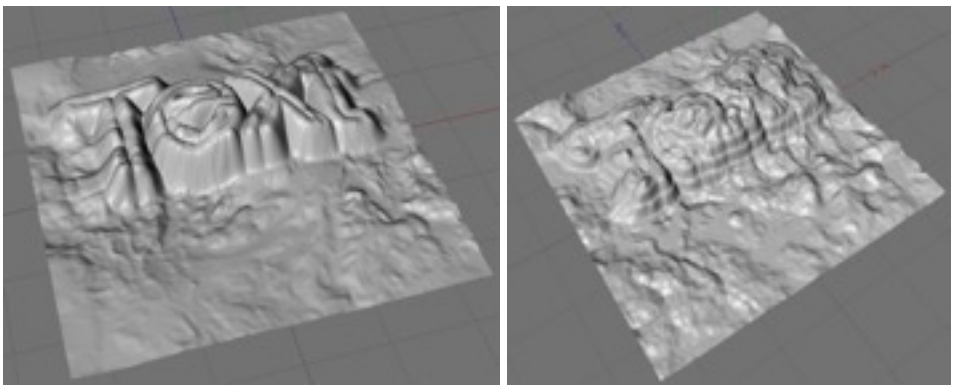
This spline curve defines the profile that the spline will form on the terrain.

11.1.1.5. Radius

This spline curve changes the radius of the spline samples in the course of the spline.

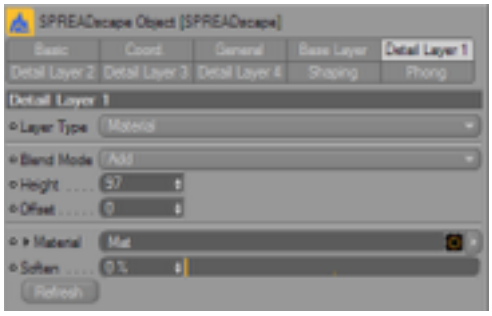
11.1.1.6. Refresh

If the shape of the linked spline depends on other objects in the scene, SPREADscape may sometimes be unable to notice if the spline has changed. In this case, click this button to force a recalculation of the terrain. In case the SPREADscape Object’s Caching option is deactivated, it will be automatically reactivated.



Two examples for Text Splines in a Detail Layer of type “Spline”

12.Layer Type “Material“



Maybe you already have a height map generated in another software, or a topographical map of a real landscape? In that case, you can create a Material, put the bitmap into its color channel, and use it in this type of SPREADscape detail layer, to shape the landscape on the basis of the bitmap.

Pro Tip: Of course, you can also use almost any channel shader available in Cinema 4D. That way, you can e.g., use a simple Cinema 4D Sunburst shader to create an impressive volcanic crater. Note that SPREADscape always uses UVW mapping to apply the material to a detail layer.

This layer type offers the following parameters:

12.1.1.1. Material

Link the material here whose color channel should be evaluated.

12.1.1.2. Soften

Maps with very high resolution, as well as some procedural shaders, tend to create edgy artifacts on the terrain’s geometry. Use the Soften parameter to compensate for this. It applies a simple Mip Mapping to the material.

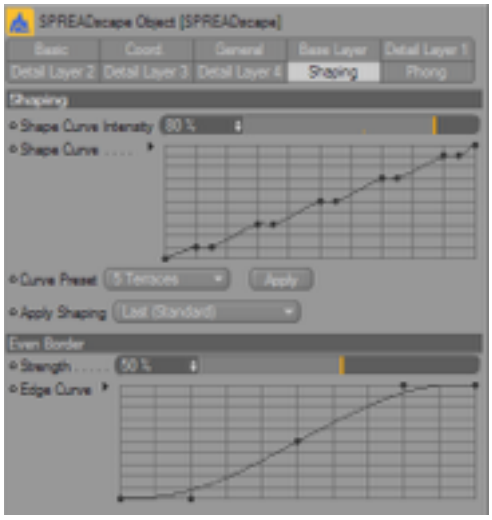
12.1.1.3. Refresh

Changes in a linked material are not recognized by SPREADscape automatically when the Caching option is activated. If you want to refresh the terrain after changing something in a linked material, click this button. If the Caching option is currently deactivated, it will be automatically reactivated.

“Fallen Goddess” by Michael Auerbach.
Face and breast were made using a SPREADscape Object with material layer.

13.Shaping

If you thought the base layer and all the detail layers held all of the fun, take a look at the Shaping tab! With the functions found in this tab you can re-shape your whole terrain according to your wishes. Terraces, plateaus, dunes, changes to the slopes' steepness — all of this is possible here.



13.1.1.1. Shape Curve Intensity

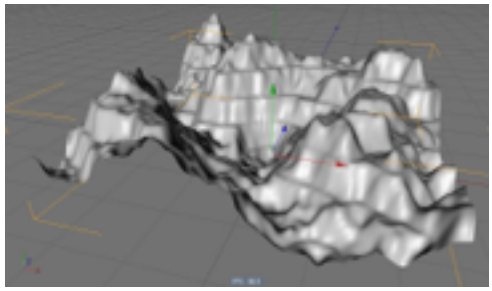
This parameter controls the intensity of the shape curve's effect.

13.1.1.2. Shape Curve

Using this curve, you can apply a multitude of shapes to your terrain. Either create your own shaping curve, or use one of the preset curves.

13.1.1.3. Curve Preset

Here you can fine several shaping curve presets. Among these are standard curves like "Glaciation," "Canonization," "Plateau," "Terraces," and more.

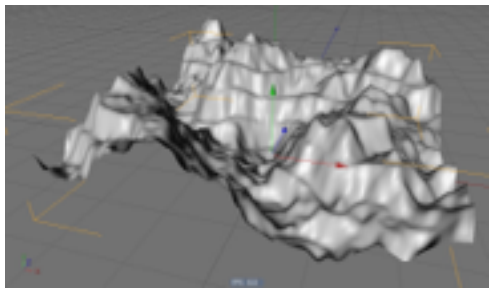


13.1.1.4. Apply

Click this button to apply the selected curve preset. The previously set shaping curve will be lost.

13.1.1.5. Apply Shaping

By default, the shaping curve is applied to the terrain after all detail layers have been calculated. Using this parameter, you can insert the shaping curve at an earlier point of the layer stack. That way, you can displace the curve's shaping by successive detail layers.



13.1.1.6. Even Border: Strength

Use this parameter if you don't want a continuous landscape, but rather a single mountain. The value seamlessly blends between landscape and mountain.

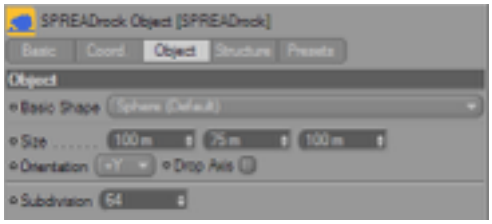
13.1.1.7. Edge Curve

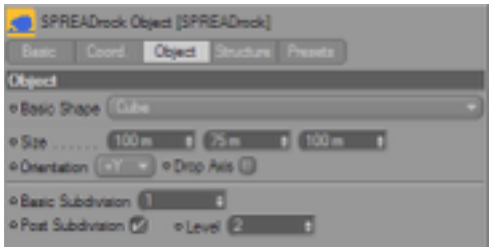
This curve controls the edge intensity, and therefore the mountain's falloff.

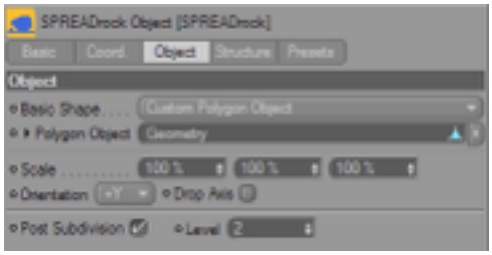
13.1.8. Phong

This tab simply holds the same parameters that you already know from the Cinema 4D Phong tag. Generally, you will not have to change anything here.

13.5. SPREADrock Object







The SPREADrock generates a parametric rock. The time-consuming process of manual modeling different rocks for a bigger scene is now a thing of the past, thanks to the SPREADrock Object.

Pro Tip: Experimentation with the SPREADrock Object parameters will reveal applications for this function beyond mere rocks.

13.5.1. Object

Here you find the basic parameters of the SPREADrock Object.

13.5.1.1. Basic Shape

Here you can select if you want to use a sphere, a cube, a pyramid, or a custom polygon object.

13.5.1.2. Polygon Object

If you selected "Custom Polygon Object" as the basic shape, you can link a polygon object here.

13.5.1.3. Size

Set the basic dimensions of the rock here if you are using one of the preset basic shapes.

13.5.1.4. Scale

If you use a custom polygon object, you can adjust its scale here.

13.5.1.5. Orientation

This controls the rock's orientation by flipping the geometry to the selected axis. To clone a rock with the SurfaceSPREAD Object, it's a good idea to set this to "+Z" and activate the "Drop axis" option.

13.5.1.6. Drop Axis

By default, the origin of the rock is located in the rock's center. This option moves the origin further down, making the realistic distribution on a surface easier.

13.5.1.7. Subdivision / Basic Subdivision

This parameter is only visible if you use one of the preset basic shapes. Define the geometry subdivision here. Anything from Low Poly models with only 20 polygons to High Detail meteoroids with several million polygons is possible. A higher subdivision always produces more details, while a lower subdivision offers better performance.

13.5.1.8. Pre Subdivision

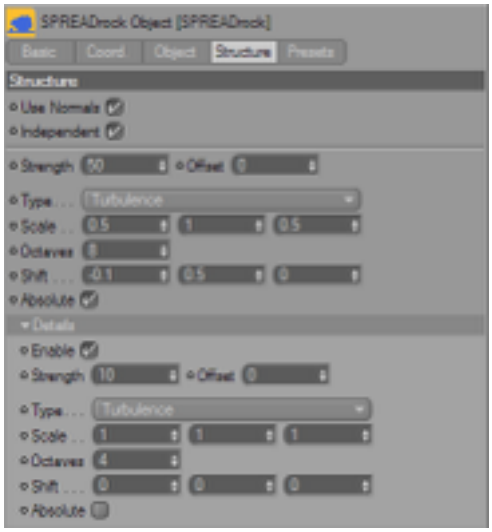
This parameter is only visible if you have set the Basic Shape to "Custom Polygon Object." It will apply a hard subdivision to the polygon object, preserving its shape more precisely.

13.5.1.9. Post Subdivision

This parameter is only visible if you do not use a sphere as the basic shape. It applies a HyperNURBS subdivision to the selected basic shape. This enables you to add more details without altering the basic shape too much.

14.Structure

This section holds the parameters for the rock structure.



14.1.1.1. Use Normals

If this option is deactivated, the structure is calculated on the basis of the basic shape's origin. If you activate this option, the average vertex normals will be used. This is more precise, but calculates a bit slower.

14.1.1.2. Independent

If this option is activated, the scaling of the structure will be independent from the rock's base dimensions. If you change the dimensions of the rock, you can create crazy effects while this option is activated. If you deactivate it, the structure's scaling will change according to the rock's dimensions.

14.1.1.3. Strength

Control the intensity of the structure with this parameter. If the value is 0, no structure will be visible.

14.1.1.4. Offset

If your rock gets too big due to the structure strength, you can correct it using this value without losing the structure's intensity.

14.1.1.5. Type

Select the desired fractal function here. You can choose from "Noise," "Turbulence" and "Wavy Turbulence".

14.1.1.6. Scale

You can change the structure's scaling along the 3 dimensions separately with this parameter.

14.1.1.7. Octaves

The detail of the structure can be controlled with this parameter. Very high values may cause a slight performance decrease.

14.1.1.8. Shift

With this parameter, you can move the structure in a three directions, creating an infinite amount of variations of a rock.

14.1.1.9. Absolute

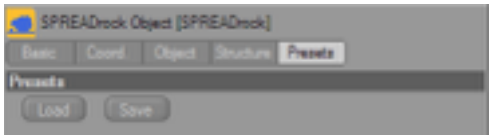
This option is only available for the "Turbulence" fractal function. It changes the look of the structure, making it more "knobby."

14.1.1.10. Details

This group offers the same parameters as the normal structure. Use these to add more details to the SPREADrock geometry without changing the basic structure of the geometry.

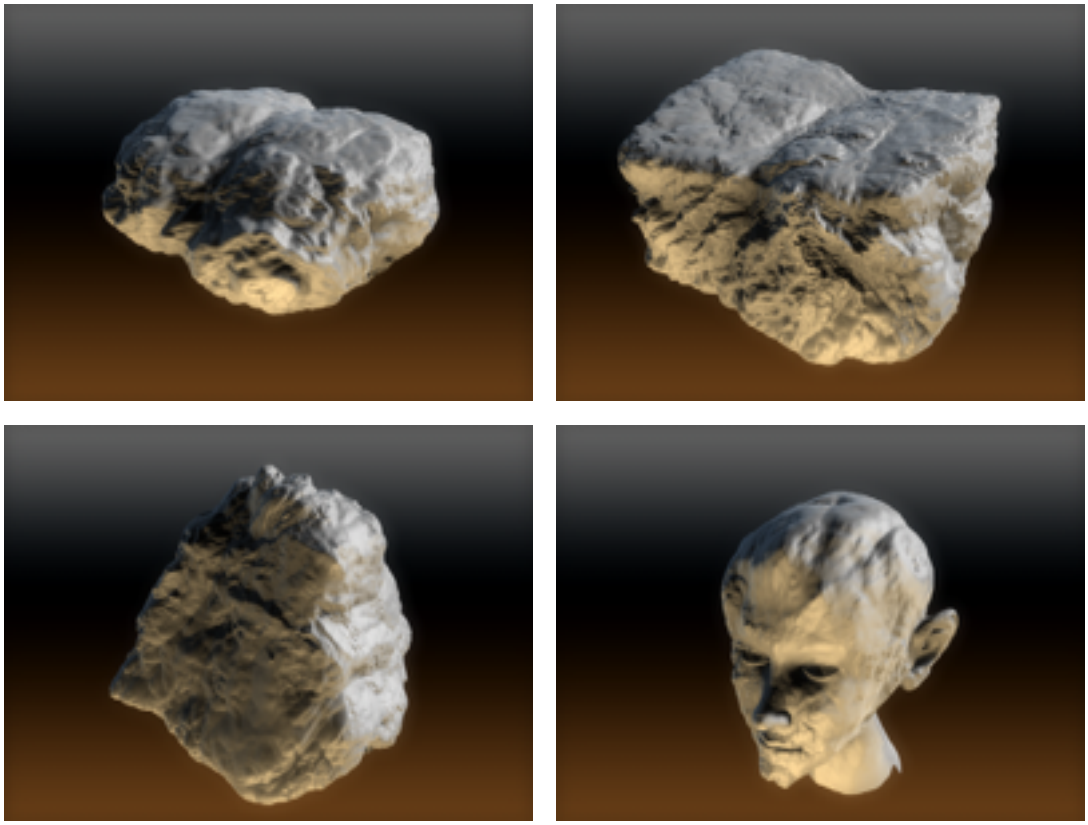
15.Presets

If you like the rock you've created, you can save it's parameters into a .rock file and load it again when needed.



15.1.1.1. Load / Save

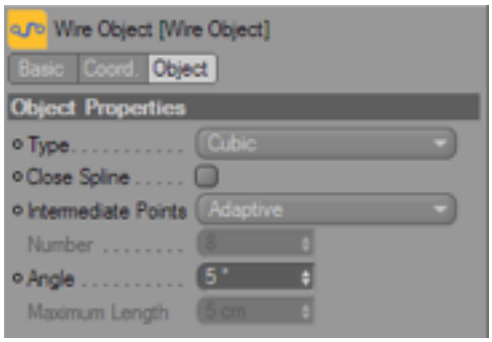
These buttons open the standard load/save dialogs.



Examples of different SPREADrocks

15.6. Wire Object

The Wire Object is a little bonus object in SurfaceSPREAD. It creates a selectable type of spline (Linear, B-Spline, Cubic, Akima, Bezier) along any number of objects. Just take a couple of Null objects (we call them Path Objects), make them children of the Wire Object, and you will get a spline that is controlled by the Null objects. If you clone Null objects on a surface using the SurfaceSPREAD Object, you can link a Wire Object as "Virtual Parent" in the SurfaceSPREAD Object and get instant spaghetti, hair balls, or cable tangle.

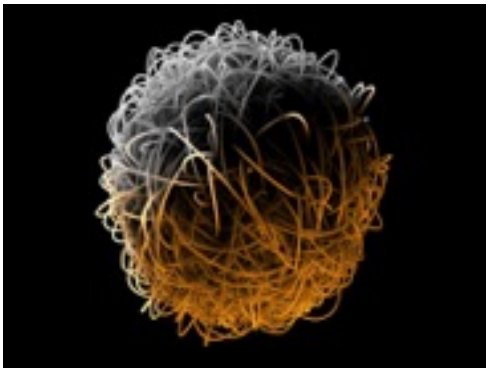


Pro Tip: You can make good use of the Wire Object in everyday modeling as well as in as animation. For example, you can use animated Null object to create an animated spline, without the restrictions of PLA animation.

Bezier Splines

Since version 1.00.17, it is also possible to create Bezier splines. This is done by assigning child objects to the Path Objects to control the spline tangents. A Path Object without a child will create a hard spline point. A Path Object with one child will create a soft spline point with controllable tangent. A Path Object with two children will create a spline point with two controllable tangents.

The parameters of the Wire Object are exactly the same as in all other standard splines.



The Wire Object, used as Virtual Parent, in the

15.6.1. Type

Select the desired spline type here (Linear, Cubic, Akima, B-Spline, Bezier).

15.6.2. Close Spline

Activate this checkbox to close the spline. The two ends of the spline will then be connected.

15.6.3. Intermediate Points

Set the desired interpolation for the intermediate points here.

15.6.4. Number, Angle, Maximum Length

These parameters control the quality of the selected intermediate point interpolation. Generally, more intermediate points produce better quality, while fewer intermediate points give better performance.

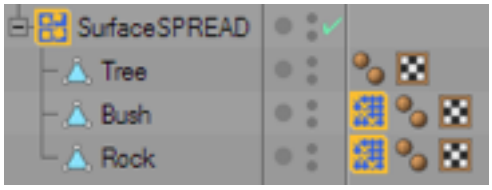
15.6.5. Show Visualization

Here you can activate the visualization for Path Objects and tangents.

15.6.6. Add Path Objects

In this section, you will find buttons with which you can directly create a new Path Object. If the Spline type is set to "Bezier," you will find separate buttons for Path Objects without tangents, with one tangent, or with two tangents.

15.7. Distribution Override Tag

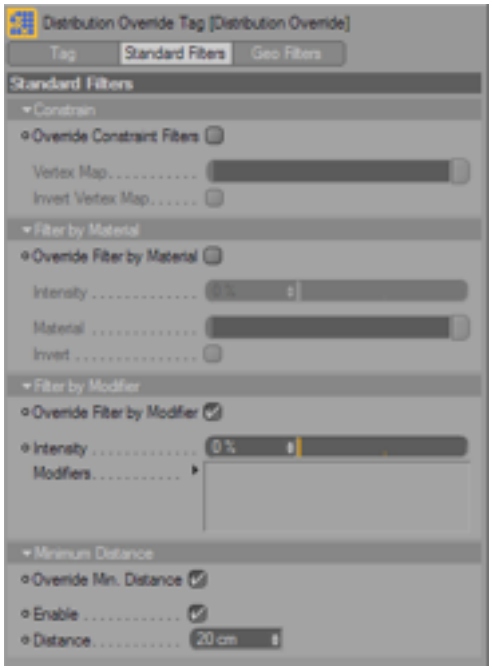


The Distribution Override Tag offers the interesting possibility to manipulate the clones' distribution on an object basis. Think of a mountainous landscape with bushes, trees and rocks. The trees can only grow until a certain altitude level (natural tree limit). The bushes may even grow in greater altitude, but also have a limit. Rocks may even occur on the highest summit. However, trees and bushes may grow on relatively steep slopes, where no rocks are to be found (because they would roll down the slope).

As you noticed, trees, bushes and rocks need quite different distribution settings. Of course, you could use a separate SurfaceSPREAD Object for each of these objects, but that makes for a more complicated workflow. Also, you would not be able to prevent the intersection between different kinds of objects using the "Minimum Distance" filter.

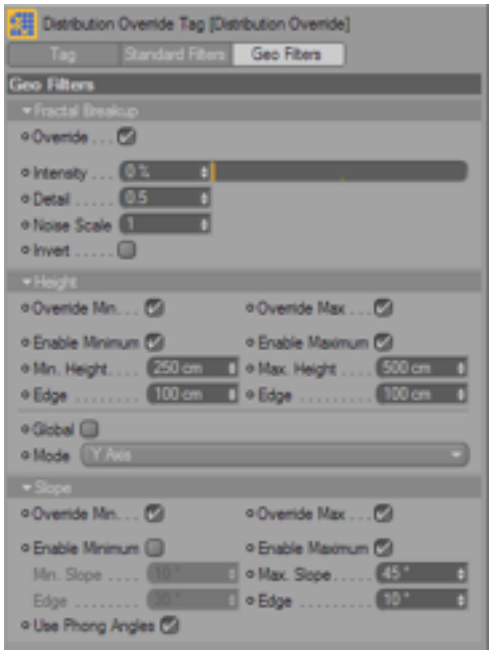
The Distribution Override Tag is the ideal solution for this problem. Attach it to one or more of the original objects that you want to clone, and override any distribution setting from the SurfaceSPREAD Object with custom values that will only apply to clones of that particular object.

All filter types that you already know from the SurfaceSPREAD Object are available, except for Polygon Selection in the Standard Filters (2.1.2.1),.



Override

Each parameter set in the Distribution Override Tag comes with an "Override" option. If this option is activated, the settings from the tag will be used for distribution. If it's deactivated, the settings from the SurfaceSPREAD Object will be used.



15.8. SurfaceSPREAD Clone Shader

The SurfaceSPREAD Shader is a normal channel shader that can be used in all channels of the Cinema 4D standard material, as well as in the special materials of VrayForC4D. Of course, it can also be combined with other shaders or textures, using a Layer Shader or a Fusion Shader.

The shader's task is to visualize data that was calculated by SurfaceSPREAD. You can apply color depending on results of the SurfaceSPREAD filters, or you can use a random color for each clone. The latter is very useful for applying a different color to each tree in a forest. Which colors are available to the clones can easily be defined using a color gradient.

Important: The SurfaceSPREAD Shader has to be rendered in order to show the results. Therefore, the shader results won't show up in the editor view. If you want a quick preview, you can use the Interactive Render Region of Cinema 4D. That way, a preview rendering in the editor is automatically generated when you make changes to the shader.

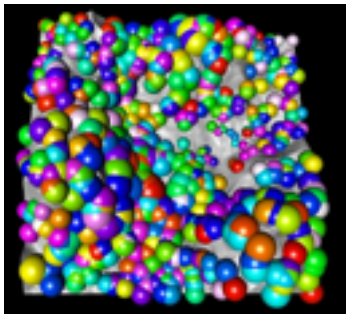
15.8.1. Gradient

A color from this gradient is applied to each of the clones. Define all colors here that should be available to the clones.

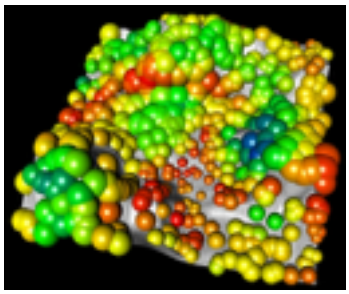
15.8.2. Source Data

The shader can evaluate different data sources. Most of them are derived from the SurfaceSPREAD Object's filter system. The following data sources are available:

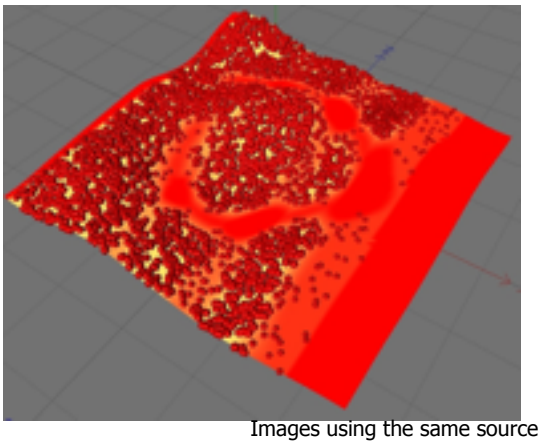
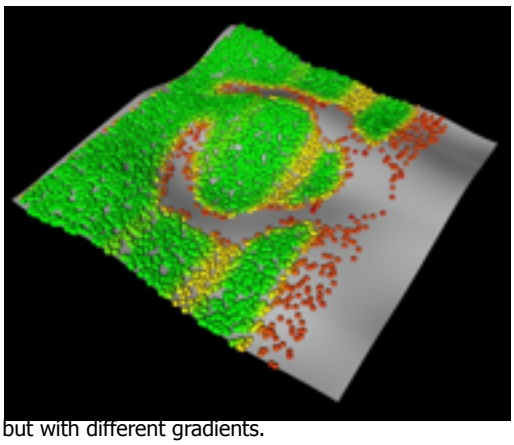
- **Random**
  In this mode, a random color from the gradient is applied to each clone. Use a gradient in different green and green-yellow colors for a forest, for example.



- **Noise**
  This mode also applies a random color from the gradient. The difference is that this mode does not use hard random numbers for picking the color, but makes its choice on the basis of a 3D noise field, depending on each clone's position. That way you don't get a totally random result; the clones will instead be colored in groups.

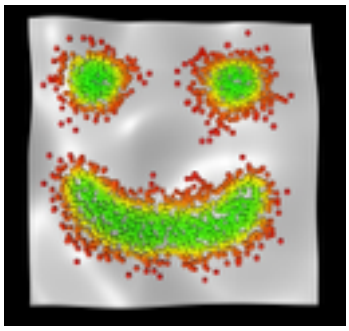


- **Filter: Vertex Map**
  The clones get their color from the vertex map linked in the Vertex Map Filter of the SurfaceSPREAD Object (or in the Distribution Override Tag). A vertex weighting of 0% returns the color from the left end of the gradient, 100% returns the color from the right end. All values between 0% and 100% return the colors from the corresponding positions in the gradient.
-
- **Filter: Distribution Modifier**
  This mode uses the weighting that has been calculated by the "Filter by Modifier" filter for picking a color from the gradient. That way you can easily apply, e.g., a different green to trees at the edge of a clearance in the forest.

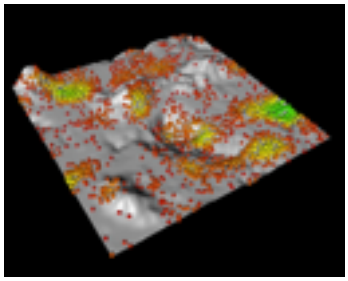



Images using the same source data, but with different gradients.

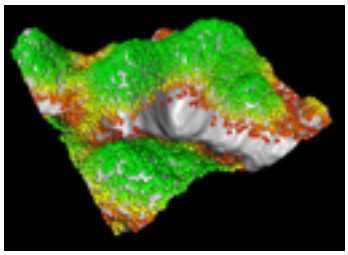
- **Filter: Material**
  This mode uses the weighting from the "Filter by Material" filter for picking a color from the gradient.



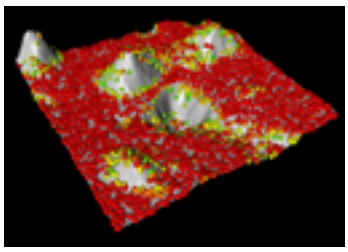
- **Geo Filter: Fractal Breakup**
  This mode gets its data from the "Fractal Breakup" Geo Filter.



- **Geo Filter: Altitude**
  This mode uses weighting results from the "Altitude" Geo Filter. That way, you can apply, e.g., a different green to the trees near the tree limit.



- **Geo Filter: Slope**
  This mode, (you guessed it) uses weighting results from the "Slope" Geo Filter.



15.8.3. Noise

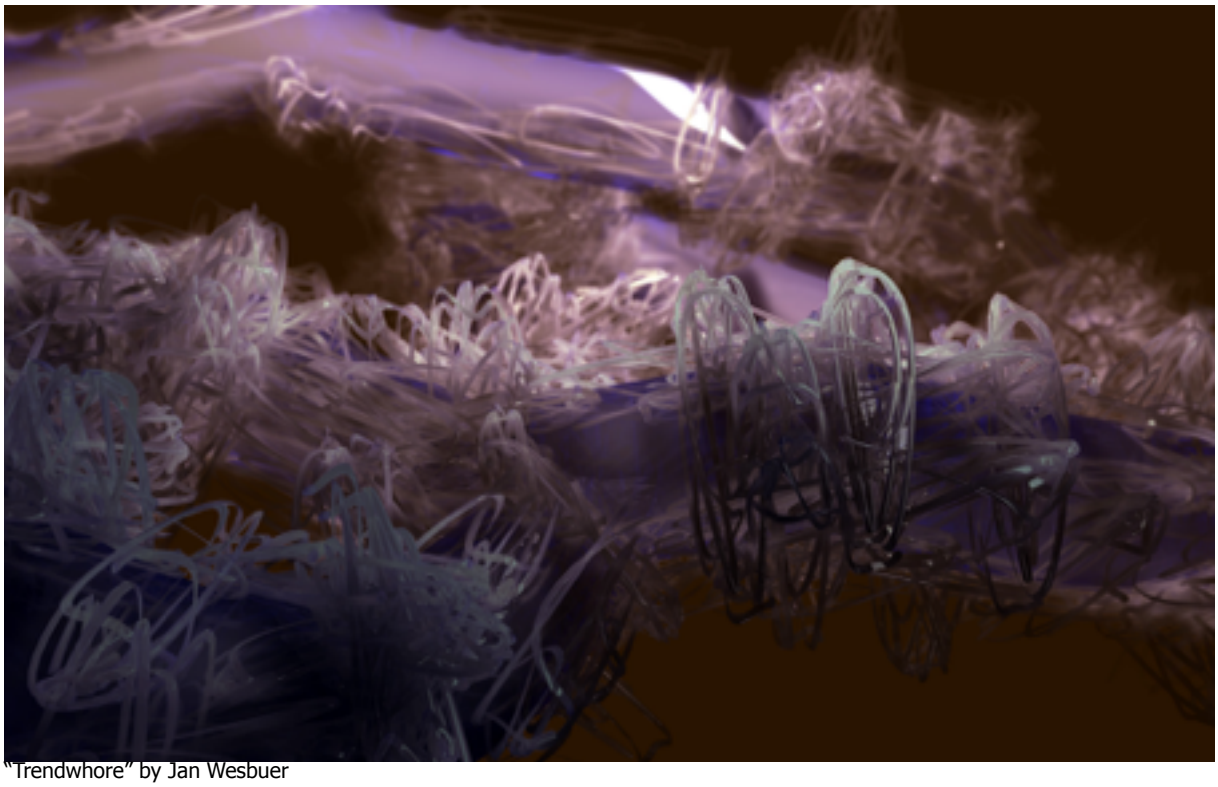
This parameter group is only visible of the data source "Noise" is selected.

15.8.3.1. Noise Scale

Greater values produce a more detailed color variation of the clones.

15.8.3.2. Noise Variation

Change this value to produce an infinite amount of different variations.



"Trendwhore" by Jan Wesbuer

15.9. SurfaceSPREAD Distance Shader

The Distance Shader can be compared with a Proximal Shader that refers to the distance between the active camera and the geometry surface. It is very suitable for use, e.g., as a mask in the Fusion Shader to blend between two different textures or shaders. That way you can e.g., create a material for a mountain that, if seen from greater distance, shows a non-tiling procedural structure; but in a close-up will show a photographic texture.

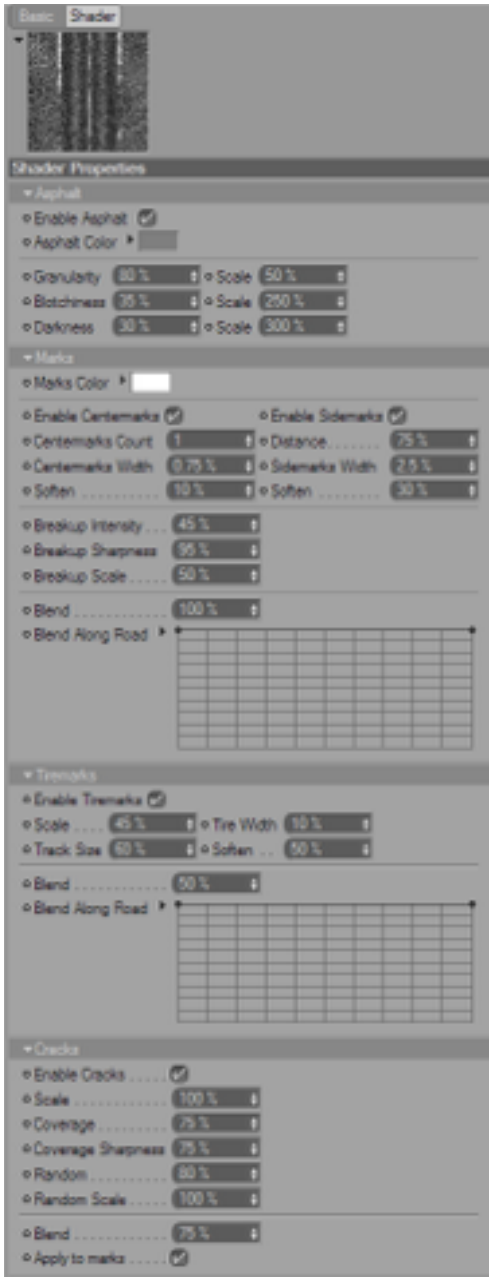
15.9.1. Start

The shader activates starting with this distance from the camera. All parts of the geometry that are nearer to the camera will get the color of the gradient's left end.

15.9.2. Depth

This parameter controls the spatial depth of the gradient. Starting with the distance defined by the Depth parameter, the shader picks a color from the gradient. All parts of the geometry that are further from the camera than Start + Depth will get the color from the right end of the gradient.

15.10.SurfaceSPREAD Road Shader



The Road Shader generates a procedural road. It provides detailed parameters for the character and condition of the asphalt, as well as for road markings, tire abrasion and surface damage. In most cases, you won't need to create cumbersome combinations of numerous Tiles, Noise and Layer shaders anymore, which are difficult to operate. The SurfaceSPREAD Road Shader does it all for you and, in most cases, renders faster than an equivalent self-made shader combination.

Since the road markings and tiremarks go along the V direction in UV space, the Road Shader is ideal for being used on streets that were created using a SweepNURBS.

The Road Shader is divided into several layers, which are explained in the following:

15.10.1. Asphalt

The Asphalt layer is the basic layer of the road. Many styles are possible, ranging from concrete to tar.

15.10.1.1. Asphalt Color

The basic color of the asphalt.

15.10.1.2. Granularity

Higher values make the asphalt look more coarse.

15.10.1.3. Blotchiness

This parameter creates a variation in asphalt color and brightness, increasing the realism.

15.10.1.4. Darkness

This parameters adds variations in asphalt brightness and makes for a dirtier look.

15.10.2. Marks

This layer paints road marks on the street. The marks can also be damaged.

15.10.2.1. Marks Color

The marks' color. Normally, this will be yellow or white.

15.10.2.2. Centermarks Count

The count of centermarks in V direction. A value of "1" creates one continuous stripe. Higher values will result in a dashed line.

15.10.2.3. Centermarks Width

The width of the centermark.

15.10.2.4. Distance

The distance of side marks from each other (or in other words: the width of the road).

15.10.2.5. Sidemarks Width

The width of the sidemarks.

15.10.2.6. Soften

The higher you set this value, the more blurry the edges of marks will be. This parameter often help with anti-alias problems on more distant parts of the road.

15.10.2.7. Breakup Intensity

Increase this value to add damage to the marks.

15.10.2.8. Breakup Sharpness

Lower values will produce a soft variation in the marks' opacity. Higher values will look like the marks have been damaged or ripped off.

15.10.2.9. Breakup Scale

This parameter controls the size of the marks' damage.

15.10.2.10. Blend

Use this parameter to control the opacity of the marks.

15.10.2.11. Blend Along Road

With this parameter, you can selectively control the marks' opacity along the road.

15.10.3. Tiremarks

This layer creates high traffic traces on the road, as they are found in the real world. Use this setting to make the road look as if many cars have driven on it.

15.10.3.1. Scale

The overall scale of the Tiremarks layer.

15.10.3.2. Track Size

The distance between the two tiremarks on each lane.

15.10.3.3. Tire Width

Increase this value to get thicker tiremarks.

15.10.3.4. Soften

The higher you set this value, the softer the tiremarks' falloff will appear.

15.10.3.5. Blend

This parameter controls the opacity of the tiremarks.

15.10.3.6. Blend Along Road

Use this parameter to selectively control the tiremarks' opacity along the road.

15.10.4. Cracks

You can often see cracks at the roadside where the asphalt is crumbling or tearing, especially on older or low quality roads. With this layer, you can easily recreate this effect.

15.10.4.1. Scale

The scale of cracks and fragments.

15.10.4.2. Coverage

The cracks start at the roadside. The higher you set this value, the further the cracks will reach to the road center.

15.10.4.3. Coverage Sharpness

This parameter controls the cracks' falloff from the roadside towards the center.

15.10.4.4. Random

This parameter creates a variation in the cracks' occurrence.

15.10.4.5. Random Scale

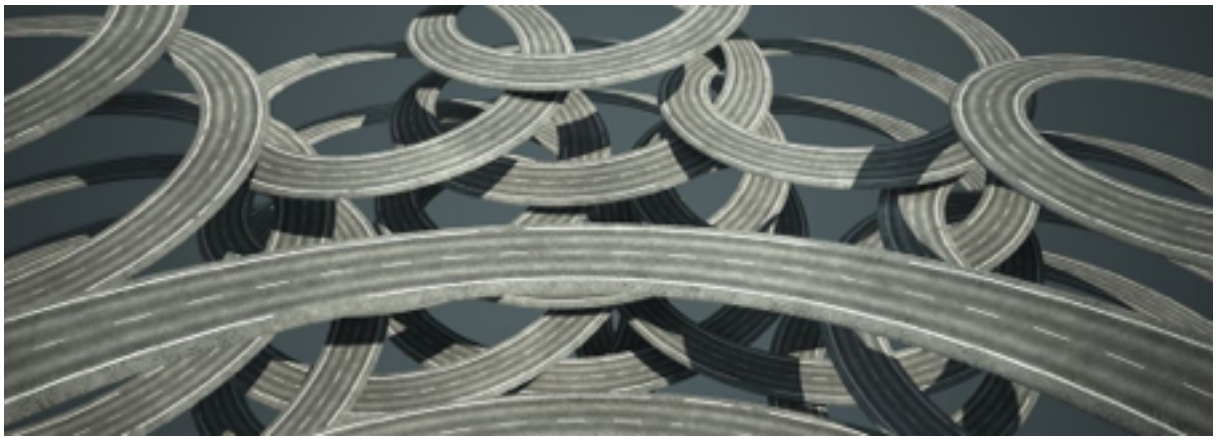
With this parameter, you can control the scale of the random variation.

15.10.4.6. Blend

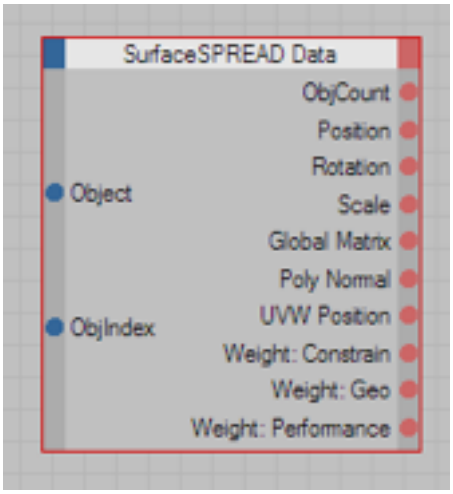
This parameter controls the opacity of the cracks layer.

15.10.4.7. Apply To Marks

Enable this option to get cracks on the sidemarks and centermarks, too. If the option is disabled, marks will be painted over the cracks.



15.11.SurfaceSPREAD Data Node



The XPresso node "SurfaceSPREAD Data" grants XPresso access to the data of the clones created by the SurfaceSPREAD Object. You can retrieve, e.g., the number of created clones, but also their position, rotation, scale, global matrix, surface normal at a clone's position, filter weight and more. Using this node, you can even combine SurfaceSPREAD and ThinkingParticles.

You will find the node in the XPresso editor's X-Pool or in the context menu under "XPresso → SurfaceSPREAD → SurfaceSPREAD Data."

Here's a complete list of the available ports:

15.11.1. Object (Input)

Type: Object
Connect this port to the outgoing port "Object" of an Object node that is linked to a SurfaceSPREAD Object in your scene. If this port is not connected (or connected to an object that's not a SurfaceSPREAD Object), the node will not work.

15.11.2. ObjIndex (Input)

Type: Integer
If you want to access the data of a clone, you must specify the index number of the desired clone here. The clones are numbered from 1 to n (number of created clones).

15.11.3. ObjCount (Output)

Type: Integer
Outputs the number of created clones.

15.11.4. Position (Output)

Type: Vector
Outputs the global position of the specified clone.

15.11.5. Rotation (Output)

Type: Vector
Outputs the global rotation (HPB) of the specified clone.

15.11.6. Scale (Output)

Type: Vector
Outputs the scale of the specified clone.

15.11.7. Global Matrix (Output)

Type: Matrix
Outputs the global matrix of the specified clone.

15.11.8. Poly Normal (Output)

Type: Vector
Outputs the surface normal of the surface geometry at the position of the specified clone.

15.11.9. UVW Position (Output)

Type: Vector
Outputs the position of the specified clone in UV coordinates of the surface geometry.

15.11.10.Weight: Constrain (Output)

Type: Real
Outputs the weight of the Constrain Filter (e.g., Vertex map) for the specified clone.

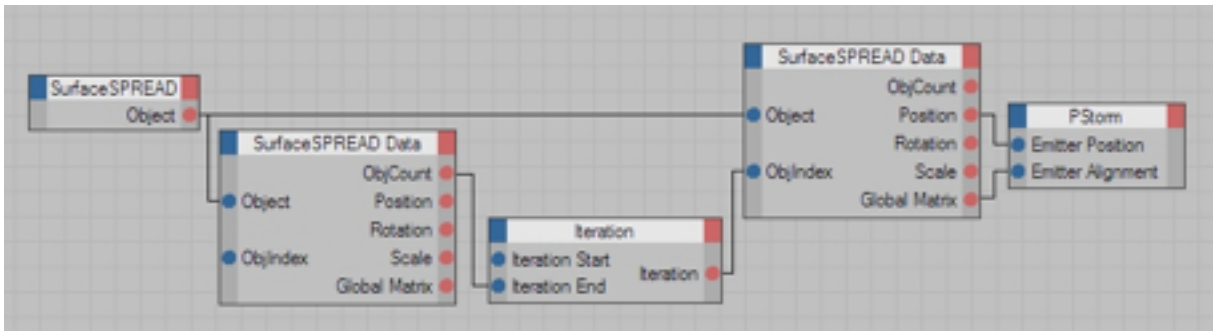
15.11.11.Weight: Geo (Output)

Type: Real
Outputs the weight of the Geo Filter for the specified clone.

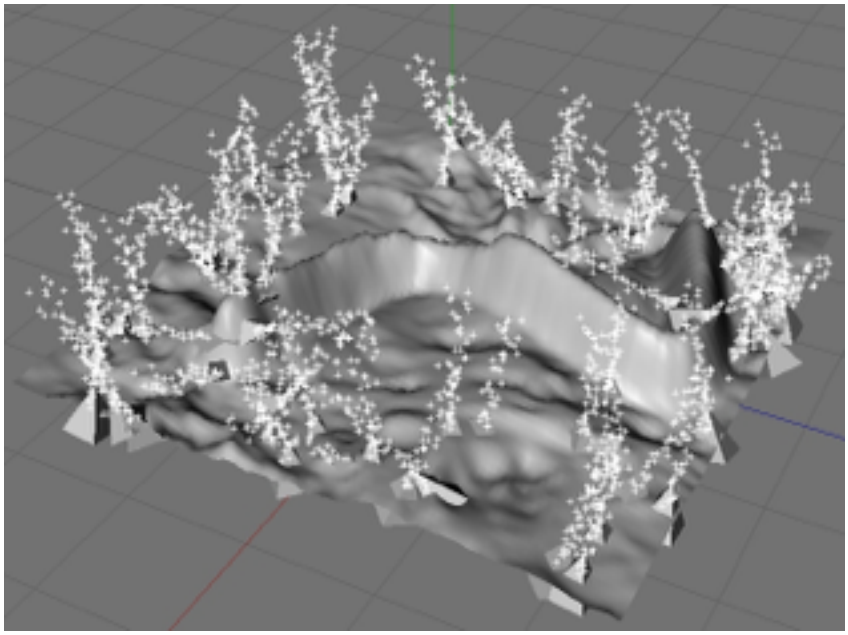
15.11.12.Weight: Performance (Output)

Type: Real
Outputs the weight of the Performance Filter for the specified clone.

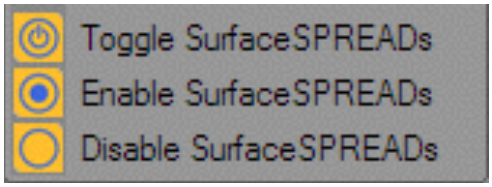
An example for the usage of the Data Node is the combination of SurfaceSPREAD and ThinkingParticles. You can e.g., make the SurfaceSPREAD clones work as TP emitters:



This setup places a TP emitter on each of the created clones and aligns the particle stream along the clones' Z axis. The result looks like this:



15.12.SurfaceSPREAD Commands



There are also three useful commands that help you control bigger scenes with multiple SurfaceSPREAD objects.

The commands are located at the bottom of the SurfaceSPREAD submenu in the Plugins menu. They don't create any objects or tags, but perform an action when clicked. If you like those commands, it's a good idea to integrate them into you Cinema 4D layout.

The commands are quickly explained here:

15.12.1. Toggle SurfaceSPREADs

This command toggles all SurfaceSPREAD Objects in the scene. That means currently inactive SurfaceSPREAD Objects will be activated, and currently active SurfaceSPREAD Objects will be deactivated.

15.12.2. Enable SurfaceSPREADs

This command activates all SurfaceSPREAD Objects in the scene.

15.12.3. Disable SurfaceSPREADs

This command deactivates all SurfaceSPREAD Objects in the scene. This is very useful if you don't need any clones at the moment because you want to concentrate on other elements of your scene.

"Rocky Riverside" by www.c4d-jack.de. Rendered with VrayForC4D and Vray Proxy Objects.

15.13.SurfaceSPREAD Library

The SurfaceSPREAD Library is a result of the cooperation of www.c4d-jack.de and www.3dplants.com. It contains a respectable selection of plants made by 3dplants.com.

15.13.1. Terms of Use

The library is free of charge for all SurfaceSPREAD customers. With the purchase of a SurfaceSPREAD license, you are also granted the private and commercial usage rights for the models and textures contained in the library (in the following, called "content"). Excluded from these usage rights are, of course, the reproduction of the content and its distribution on electronic storage media (not including your own hard drive, of course) and on the internet. In particular, not selling the content in online shopping systems, etc...

15.13.2. Installation

Download the ZIP archive containing the library file from www.c4d-jack.de (you should have received the download link and your personal password along with your license file).

To install the SurfaceSPREAD Library, unpack the .lib4d file contained in the ZIP archive into the folder "`MAXON\Cinema 4D R10\library\browser`" (Cinema 4D R10) or into the folder "`library\browser`" in your Maxon user folder (Cinema 4D R11 and higher).

You can easily find your user folder by opening the Cinema 4D preferences (menu "Edit") and click the button "Open Folder..." that is found on the "Common" page.

After you successfully copied the .lib4d file, restart Cinema 4D.

15.13.3. Usage

If you open the Content Browser (SHIFT+F8), you should find a new catalog in the "Presets" group, called "SurfaceSPREAD Library (www.3dplants.com)."

Browse the object preview images. If you want to use an object, drag it from the Content Browser into the Object Manager using your mouse. The appropriate material will be created in your Material Manager automatically.

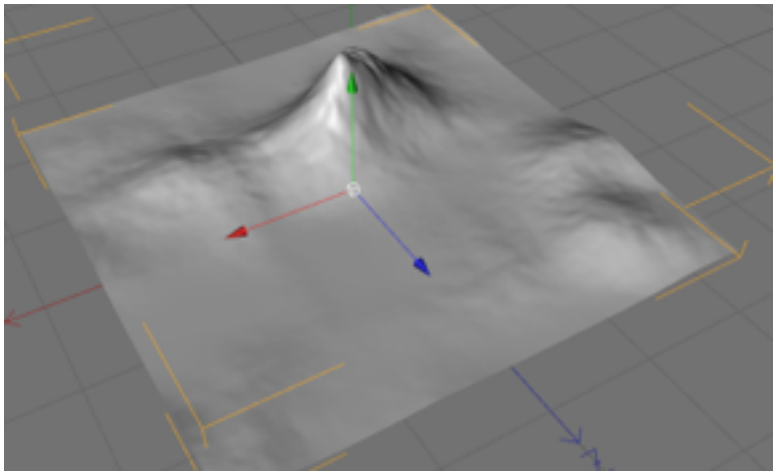
"Field of Cacti" by www.c4d-jack.de. Implemented with 3D models from the SurfaceSPREAD Library. The color variation of the cacti was made using the SurfaceSPREAD shader.

3. Using SurfaceSPREAD

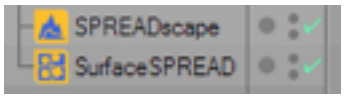
This chapter provides you with some simple instructions for getting started with SurfaceSPREAD. Not only the basics, but also hints that will make you a SurfaceSPREAD expert in no time.

3.1. Create a forest on a landscape

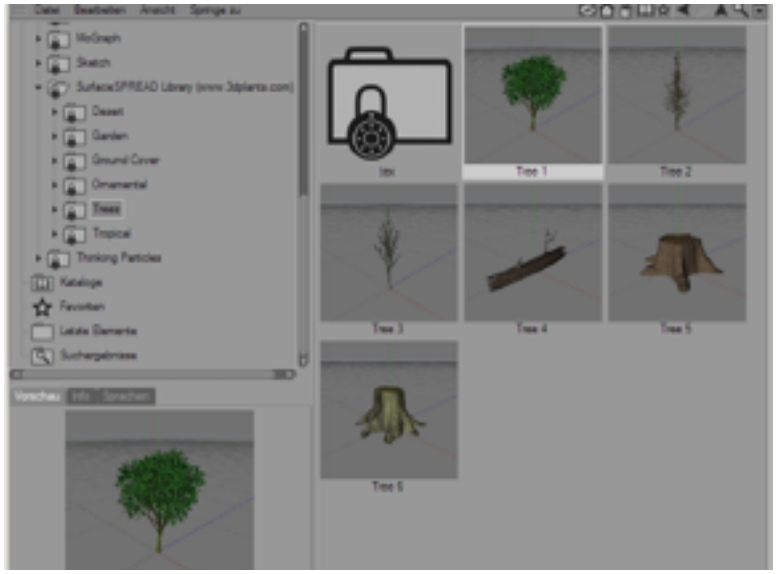
We assume that you have already created a landscape (maybe with a SPREADscape Object, using a Relief Object or with the standard Landscape Object of Cinema 4D). You now want to create a forest on this landscape.



Before generating a forest, you first have to add a SurfaceSPREAD Object from the Plugins menu to our scene.

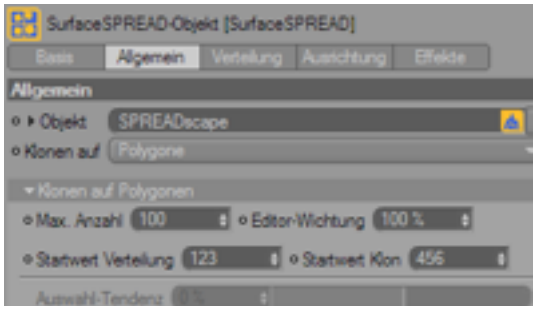


To begin with, add a tree model to your scene. You need at least one tree that you want to clone. Of course you can use any model. This example uses a tree from the SurfaceSPREAD library.

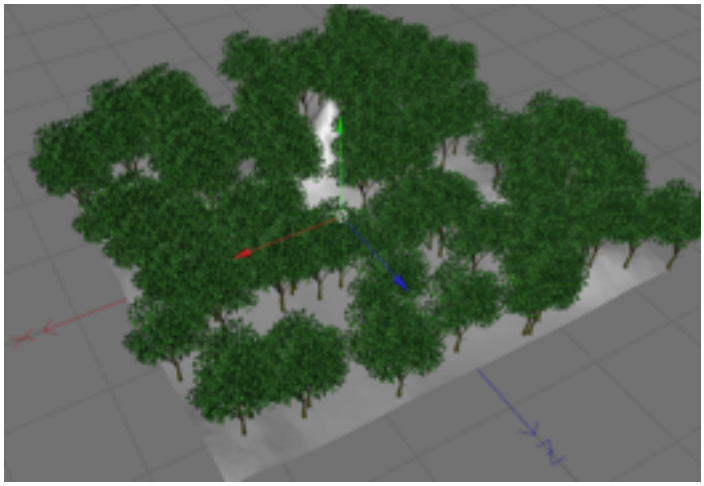


Make the tree a child of the SurfaceSPREAD Object:

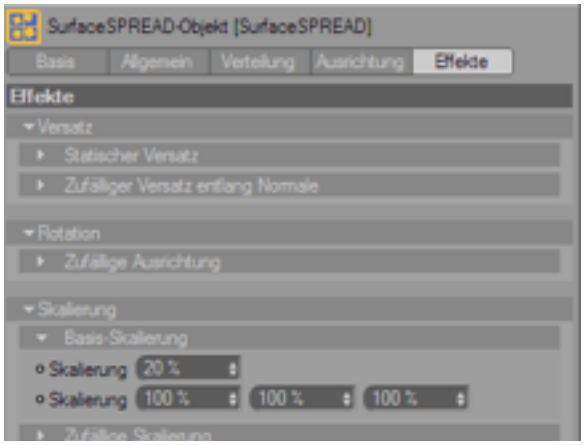
Nothing will happen. You first to tell the SurfaceSPREAD Object which geometry the clones should be generated on. Drag & Drop the landscape into the link field "Object" of the SurfaceSPREAD Object.



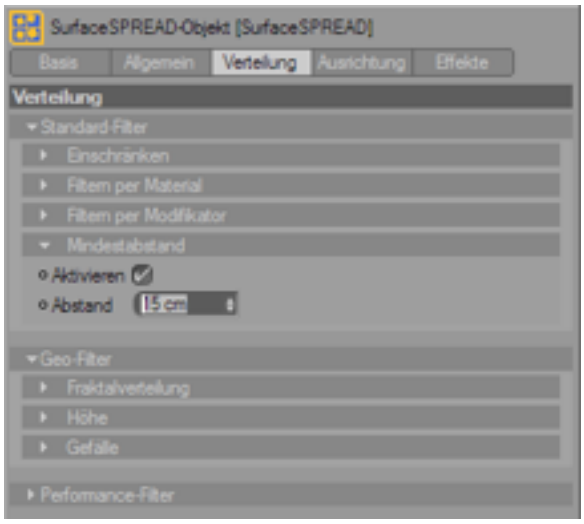
Now you'll see the first tree clones on the landscape:



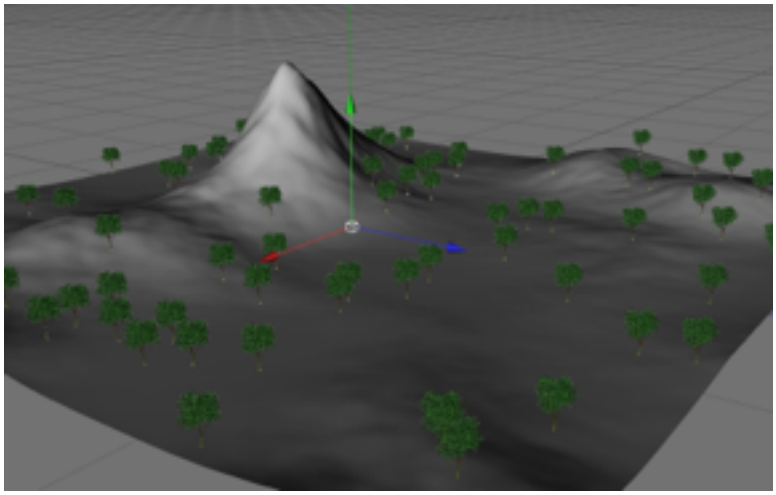
It is likely that the trees will not be the correct size. Use the parameter "Base Scale" from the "Effects" tab of the SurfaceSPREAD Object to correct the trees' scaling:



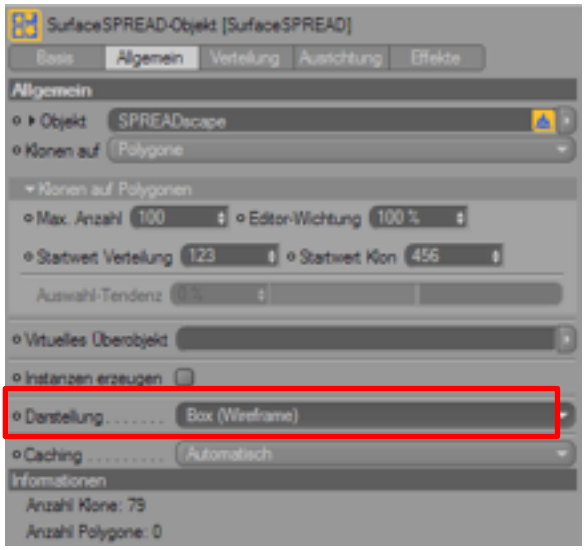
The trees are now correctly scaled. You will also probably notice some trees intersecting each other. Eliminate the intersecting trees using the filter "Minimum Distance" from the "Distribution" tab.



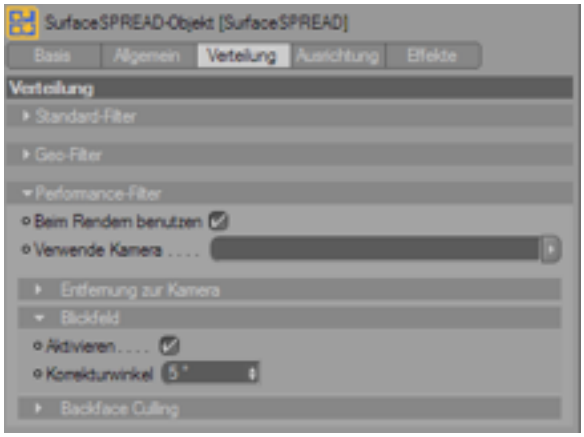
The editor should now look something like this:



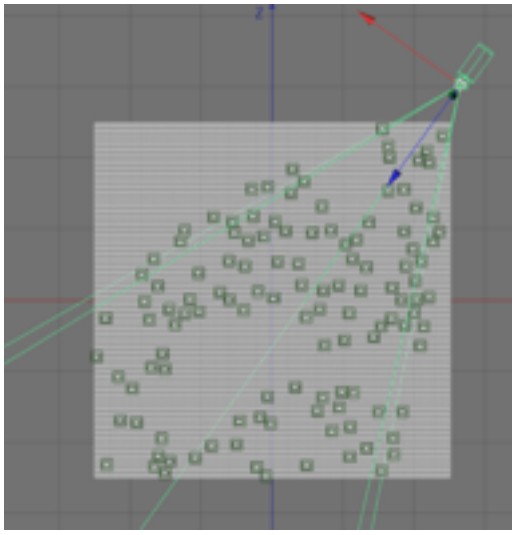
If your editor performance starts decreasing (jerky camera movement, longer delays after changing a parameter of the SurfaceSPREAD Object), switch to a simplified display, e.g., "Box (Wireframe)":



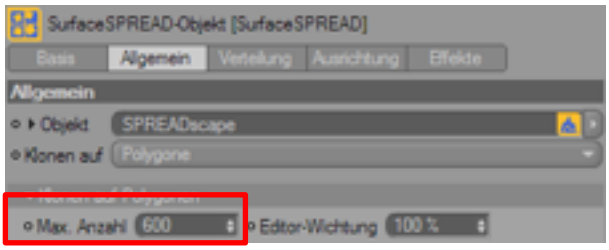
To decrease the memory usage, you can also use the filter "Camera Cone":



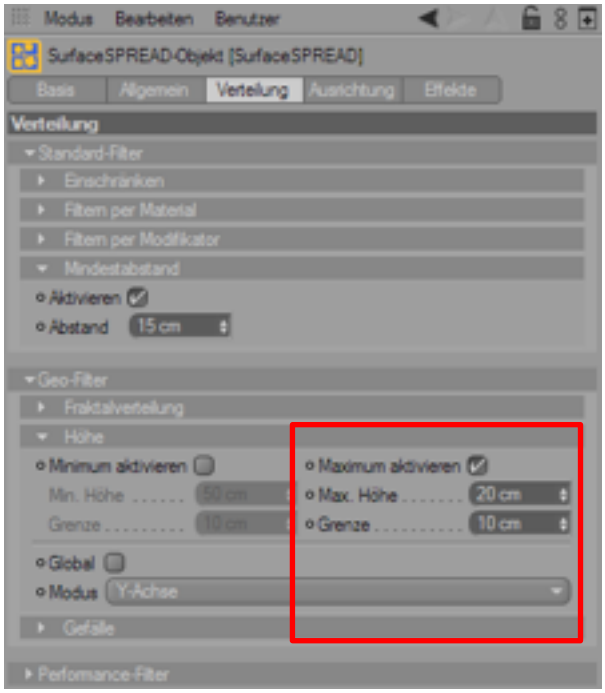
This filter eliminates clones that are not located within the FOV of the (editor) camera.



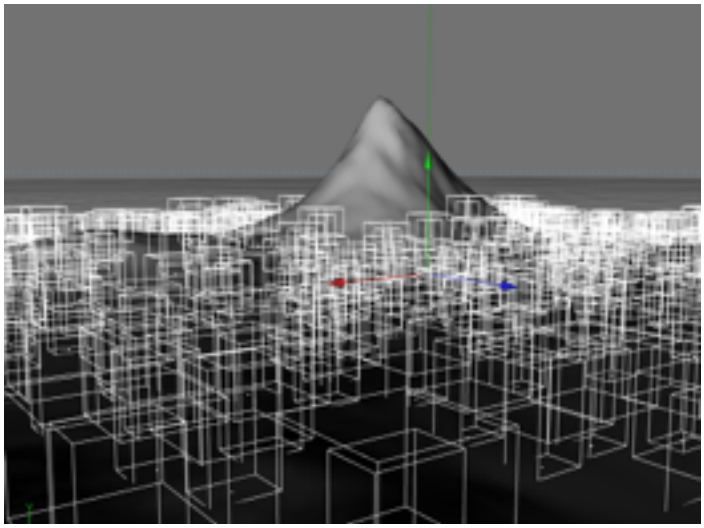
Increase the number of clones to create a dense forest:



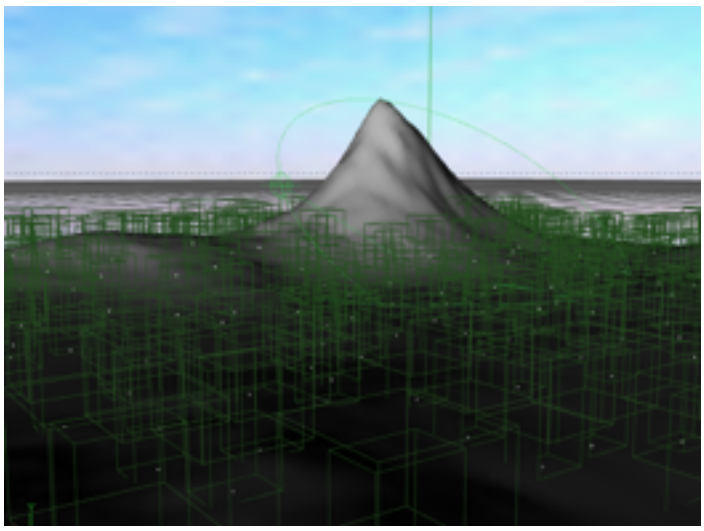
Now you can of course apply additional filters, such as the "Altitude" Geo Filter to keep the trees off the mountains:



The editor may now look like this:



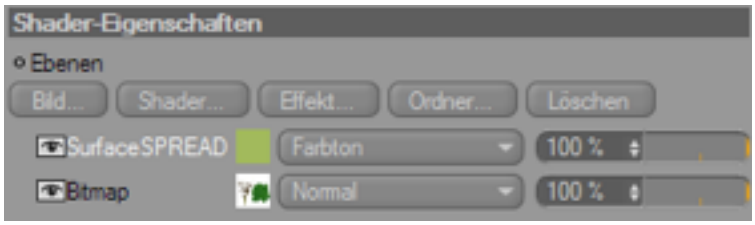
Add an infinite light source as the sun, or use a SKY object:



Now render the scene. Please note that a large number of detailed tree models can easily produce millions of polygons. Therefore, don't use too detailed models, and utilize a 64-Bit operating system. If you own VrayForC4D, create a Vray Proxy object from the tree, and clone the proxy object instead.

You have now created a simple forest. This example has only shown the most basic approach. Of course, you can make the forest much more realistic by using effects, e.g., "Random Scale" and "Random Alignment."

It would also be a good idea to utilize the SurfaceSPREAD shader in the material for the trees' leaves, in order to color each tree's leaves in a unique color. If the leaves of your trees use a bitmap texture, just put the bitmap texture into a Layer Shader. In the layer shader, put a SurfaceSPREAD Shader on top and set its layer mode to "Hue" to change the color of the bitmap:



4. Fill a bookshelf with books

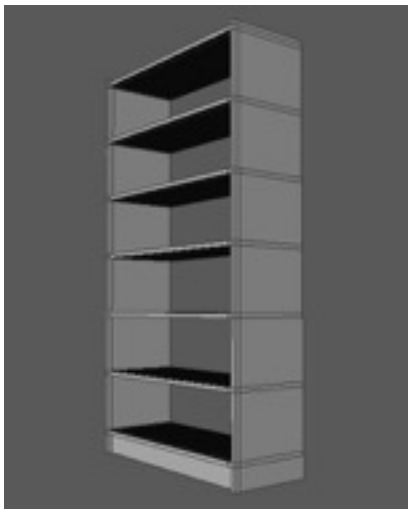
Although SurfaceSPREAD specializes in creating landscapes, it can also be used for other applications. This tutorial by Knut Schröder shows how to fill a bookshelf with books, and how to use the SurfaceSPREAD effects and shader to create a realistic result.

Part 1 "Getting started"

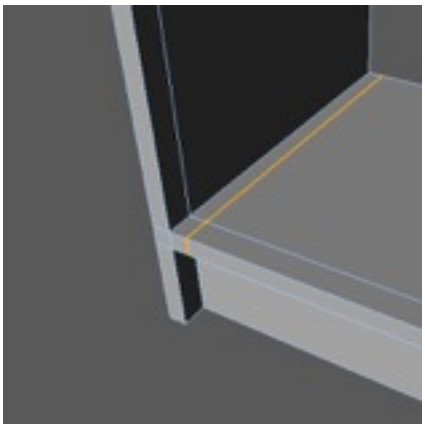
The book consists of a HyperNURBS-suitable object for the book cover, and another object with only 3 polygons for the pages. Both objects are grouped in a Null object.
This ensures that the SurfaceSPREAD Object handles the book parts as a single object.

The Null object is located at the lower front of the book. That makes the "spreading" easier to control and also more comprehensive.

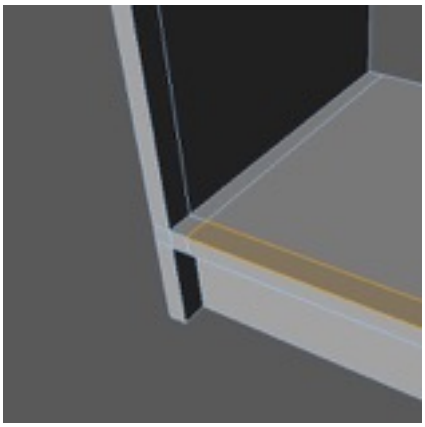
The shelf is also modeled quite simply. For close-ups, we might need some more details, but it should be sufficient for this example.



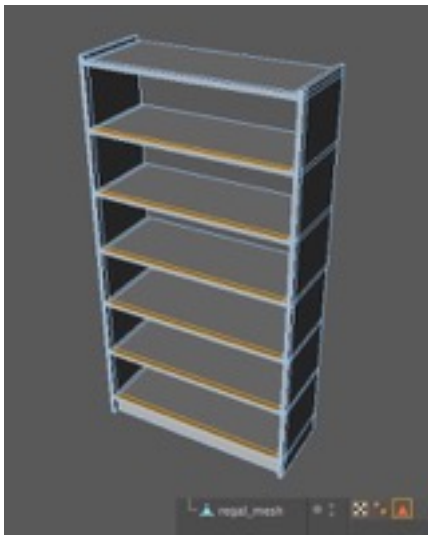
Only at the left and right ends of the shelving units do we need an additional edge loop to prevent the book from intersecting with the side panels.



In order to distribute the books along the shelves' edge, the polygons which will be used for distribution should only have a small depth (Z dimension). In the image, you can see the selected polygon that we will use for distribution. This polygon is the result of another edge loop that has been cut with the knife tool.

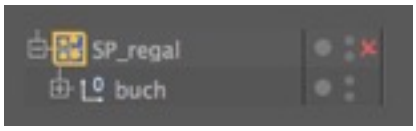


To define where the SurfaceSPREAD Object should create the book clones, we select the polygons in the front middle of the shelves and store the selection in a Polygon Selection Tag.



Part 2 "SurfaceSPREAD"

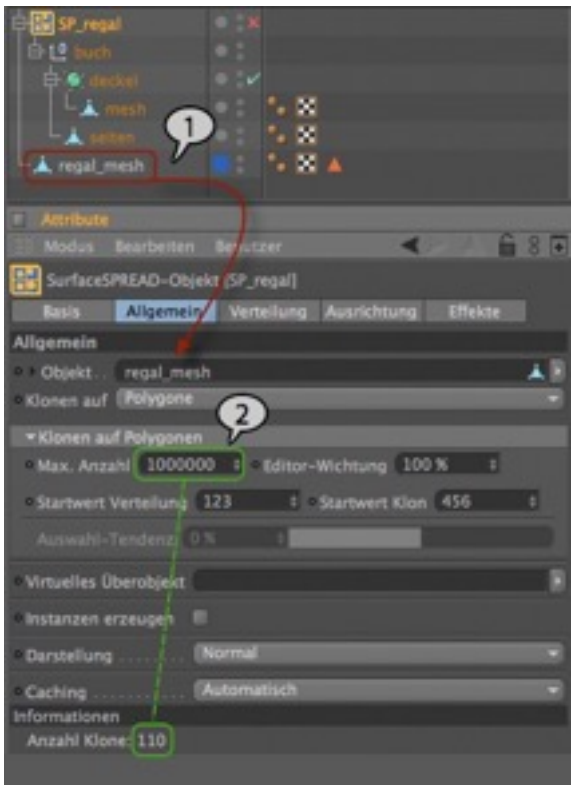
The book (the two book parts grouped in the Null Object) is made a child object of the SurfaceSPREAD Object. To be able to set the parameters more quickly, we deactivate the SurfaceSPREAD Object.



Tab "General"

1. We drag the bookshelf object into the link field "Object" of the SurfaceSPREAD Object.

2. We increase the "Max. Count" parameter to 1,000,000. This number seems absurd, but the filter settings will reduce the amount of clones drastically, resulting in only about 110 clones.



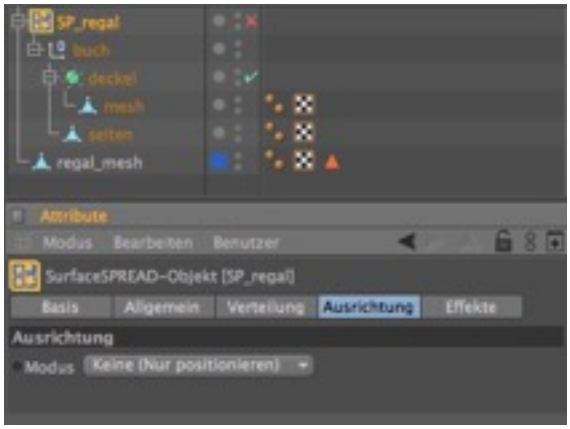
Tab "Distribution"

1. We drag the Polygon Selection Tag from the Object Manager into the link field "Polygon Selection".

2. We activate the filter "Minimum Distance" and set the value to equal the book's width.

Tab "Alignment"

Since the shelving units are just planar polygons, we can leave the alignment mode at its default value "None (Position only)."



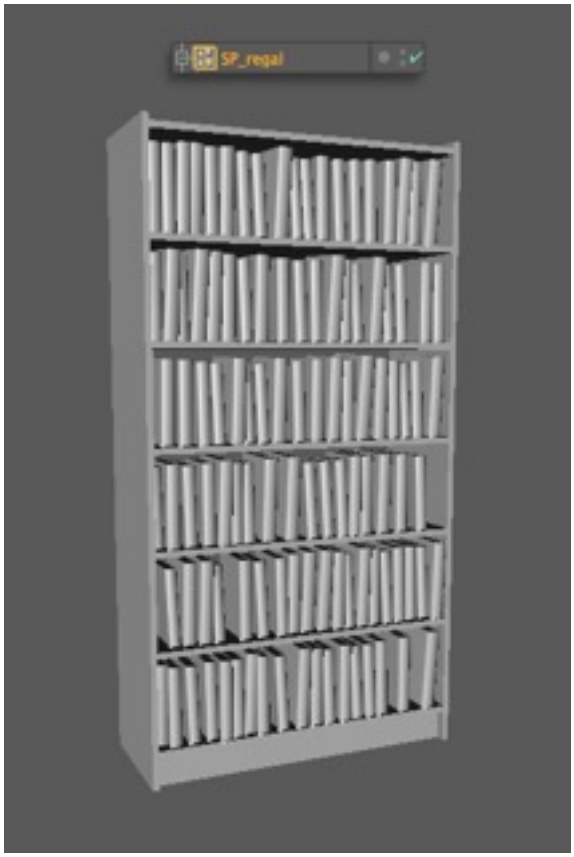
Tab "Effects"

1. To prevent the books from appearing too near to the shelving units' edge, we can control the distance using the "Static Offset" effect.

2. Small values in the effect "Random Alignment" create a nice variation. The fine tuning is done using the intensity slider.

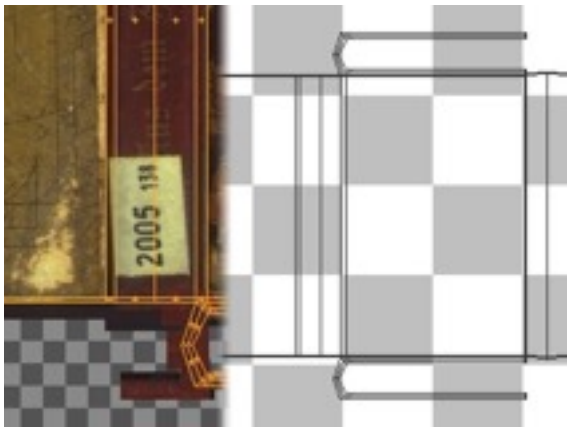
3. To apply even more variance for the book clones, we can use the "Random Scale" effect. A higher value for the X scale produces books of different thickness. Again, we do the fine tuning using the intensity slider.

After reactivating the SurfaceSPREAD Object, the following result appears:

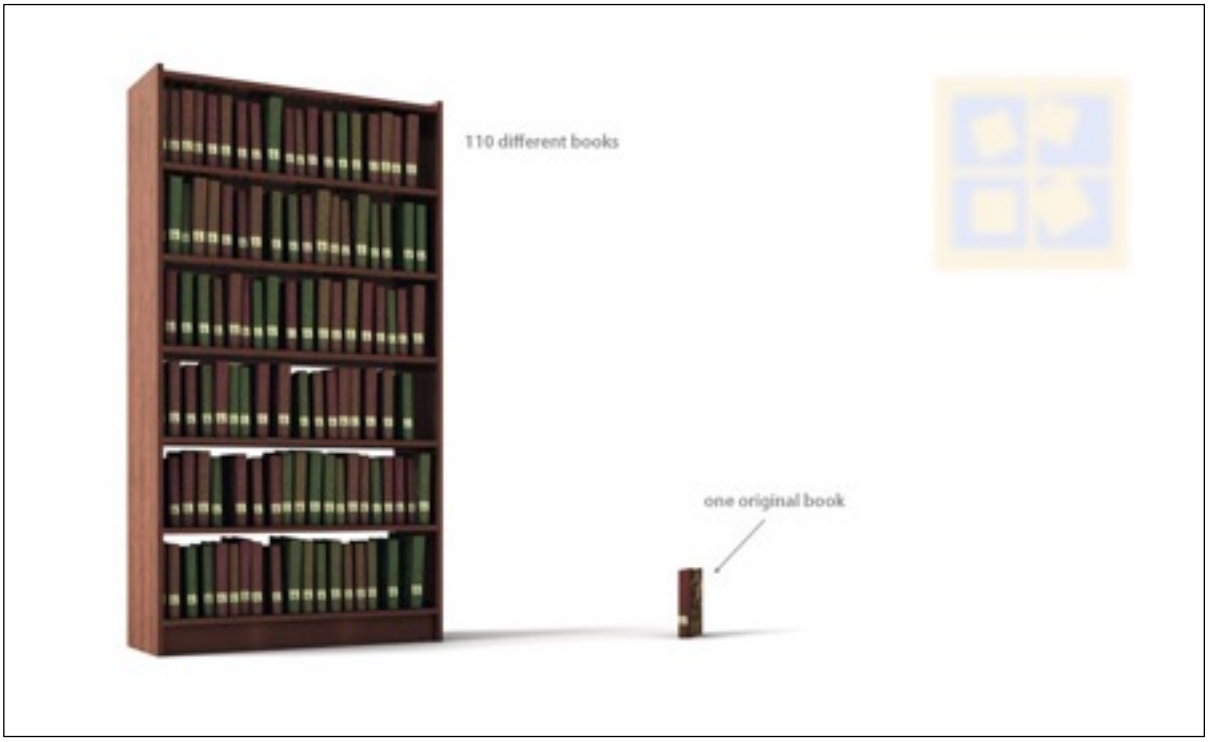


Part 3 "Shader"

To get some variation into the books' textures, we use the SurfaceSPREAD Shader within a Layer Shader to change the book cover's color. A layer mask excludes the book's label from the coloring. The SurfaceSPREAD Shader is applied in "Hue" layer mode.



The result can look like this:



4. Appendix

4.1. Frequently asked questions (FAQ)

In this chapter, you will find answers to frequently asked questions.

Q: **I bought and installed the plug-in, but it doesn't start.**

A: Please take a look into the Cinema 4D Console (Shift+F10) and see if there is an error message. Send this error message to sales@4d-jack.de.

Q: **The plug-in does not start, and there's also no error message in the console.**

A: If you're using a Mac, it may be that your disk permissions are not set correctly. In this case try "Disk Utility" and "Repair Disk Permissions." Further information on this topic can be found here:

http://docs.info.apple.com/article.html?artnum=25751
http://kb.wisc.edu/helpdesk/page.php?id=3810

Q: **I want to test the demo version, but it doesn't load.**

A: The demo version of SurfaceSPREAD only runs in the Cinema 4D DEMO. This can be downloaded from http://www.maxon.de. Within this demo, you can test SurfaceSPREAD without restrictions. If you register the Cinema 4D DEMO at Maxon, you can even save your scenes for 40 days, thus giving you the functionality of a SurfaceSPREAD full version.

Q: **I run a render farm and want to use SurfaceSPREAD for the clients. Do I have to buy a license for each machine?**

A: No, you can use SurfaceSPREAD on any number of NETrender clients and servers without having to purchase individual licenses. You only have to buy a license for each workstation (normal Cinema 4D application) that you want to use the plug-in on.

5. What will not work?

Surface geometry as a child object of the SurfaceSPREAD Object.
The SurfaceSPREAD object as a child object of its own surface geometry.

Both constellations are not supported. Cloning a landscape on itself, or looping the result of SurfaceSPREAD back into SurfaceSPREAD are not possible.

Cloning emitters

Particle emitters can not be cloned in Cinema 4D. This also applies to SurfaceSPREAD.

5.3. Troubleshooting

5.3.1. Improving SurfaceSPREAD performance

The most common reasons for low performance in the SurfaceSPREAD Object are clones with many polygons. This compromises the editor performance, e.g., by overloading the OpenGL graphics card memory with too much geometry.

You can e.g., reduce the polygon count of the original objects by hiding some sub-objects in the editor view. You can reduce the editor subdivision of generator objects and splines by using a Display Tag. Furthermore, it helps to switch the clone display to a bounding box/wireframe display in the SurfaceSPREAD Object. You can also reduce the clone count in the editor by decreasing the "Editor Weight" parameter's value.

5.3.2. Improving SPREADscape performance

The most common reasons for low performance in the SPREADscape Object are: Landscapes with very high polygon count, detail layers of type "Spline" with very high accuracy, detail layers of type "Noise" with many octaves. Complex shaders in materials linked in detail layers of type "Material" may also affect performance.

Use a Display Tag to reduce the editor level of detail of the SPREADscape geometry. This also reduces the sample quality in "Spline" detail layers automatically.

5.3.3. Delayed refresh of SurfaceSPREAD Object

If you animate the surface geometry of SurfaceSPREAD (e.g., by keyframing position, rotation or scale, or using deformers) ensure that the SurfaceSPREAD Object comes after the geometry object in the scene hierarchy. This is important for Cinema 4D to evaluate the objects in the correct order. If the SurfaceSPREAD Object comes before the geometry object, it will adapt to changes in the geometry with one frame delay.

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Frank Willeke
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35600 Bahçelievler, Karşıyaka-İzmir
Turkey

sales@c4d-jack.de
www.c4d-jack.de

5.5. Alphabetical Index

.

.lib4d 49
.lic 6
.rock 36
.scape 27

3

32 Bit 2
3dplants.com 8, 49

6

64 Bit 2

A

About 5
abrasion 43
Absolute 28, 30, 35
Accuracy 26, 31
action 48
activate 48
Add 29
Add Path Objects 37
Akima 37
Alignment 21, 22, 59
along Road 44
Alphabetical Index 67
Altitude 16, 17, 41, 54
Always 11
Angle 20, 37
Appendix 62
Apply 33
Apply Shaping 33
Apply to marks 45
asphalt 43
Asphalt 43
Asphalt Color 43
Attribute Manager 9
Automatic 11
axis 21
Axis 22

B

Backface Culling 20
Base Layer 28
Base Scale 24, 51
Basic Shape 34
Basic Subdivision 34
Bezier 37
blend 42
Blend 44, 45
Blend Mode 29
Blotchiness 43
bookshelf 56
box 10
Breakup Intensity 44
Breakup Scale 44
Breakup Sharpness 44
B-Spline 37

C

cable tangle 10
Caching 11, 27, 31, 32
Camera 19
Camera Cone 20, 53
canyons 28
Centermarks 43
channel shader 39
child 51
child object 63
Cinema 4D Demo 62
clients 62
cliffs 27
Clone on 9
Clone Seed 9
Cloning emitters 63
Close Spline 37
Commands 8, 48
Components 7
Console 62
Constrain 13, 47
Contents 3
Copyright 2
Correction Angle 20
Count 43
Coverage 44
Coverage Sharpness 44
Cracks 44
Create Instances 10
Credits 2
Cubic 37
Curve Preset 33
Custom Direction 22

D

damage 43
Darkness 43
Data Node 8
deactivate 48
decline 18
Delayed refresh 63
demo version 62
Depth 42
Detail 15
Detail Layer 27, 29
Details 35
dimensions 27, 34
direction 21, 22
Direction 18
Disable 48
Disk Permissions 62
Disk Utility 62
Display 10
distance 14, 42

Distance 43
Distance from Camera 19
Distance Shader 42
Distort 24
Distribution 12, 52, 59
Distribution Modifier 7, 14, 26, 40
Distribution Override Tag 7, 38
Distribution Seed 9
Drop Axis 34

E

Edge 16, 18, 19
Edge Curve 33
Editor Weight 9
Effects 23, 51, 60
emitters 63
Enable 48
error message 62
Even Border 33
expression tags 11

F

Falloff 31
FAQ 62
Filter by Material 13
Filter by Modifier 14, 40
filters 12
forest 50
FOV 20, 53
Fractal Breakup 15, 40
fractal functions 30
Fusion Shader 8, 39, 42

G

General 9, 27, 58
Geo 47
Geo Filters 15
Global 17
Global Matrix 46
gradient 42
Gradient 39
Granularity 43

H

hair balls 10
Height 29
hierarchy 63
Highest 29
HPB 22

I

Icons 2
Ignore Y 26
IK 11
Independent 35
Information 11
Installation 6, 49
Instances 10
intensity 29, 35
Intensity 15, 23, 24, 25, 33
Interactive Render Region 39
intersecting 14, 52
Introduction 5
Invert 16, 28

L

Layer Shader 8, 39, 55
Layer Type 29, 30, 31, 32
Length 27
Liability 65
Library 8
license 62
License Agreement 49, 64
license file 6
Limited warranty 65
Linear 37
Load 27, 36
LoftNURBS 10
Lowest 29

M

Mac 2
Marks 43
Marks Color 43
Material 13, 25, 32, 40
Max 9, 16, 18, 19, 23, 24
Max. Count 9
Max. Dist 19
Maximum 16, 18
Maximum Length 37
memory 10
memory usage 53
Metaball 10
Min 16, 18, 19, 23
Min. Dist 19
Minimum 16, 18
Minimum Distance 14, 52
Mix 21
Mode 17, 21
Modifier 7, 14, 25, 26
Modifiers 25
mountains 27, 28
Multiple use 64
Multiply 29

N

network operation 64
node 8, 46
Noise 28, 30, 35, 39, 41
Noise Scale 15, 24, 41
Noise Type 30
Noise Variation 24, 41
Nondisclosure 65
None 21
Normal 21
Normal alignment 21
Normalize 28
Number 37

O

ObjCount 46
Object 9, 34, 46
ObjIndex 46
Octaves 28, 30, 35
Off 11
Offset 11, 23, 29, 35
Offset by material 23
Orientation 34
Override 38
overview 5

P

path 26
Path Object 37
PC 2
performance 11, 20, 53, 63
Performance 19, 47
Phong 18, 21, 33
Phong Normals 21
Phong Tag 18
plants 8
Plugin 6
Poly Normal 46
Polygon Object 34
Polygon Selection 13
Position 46
Position only 21
Post Subdivision 34
Pre Subdivision 34
Presets 27, 36, 49
Privacy 66
procedural 43
profile 31
Proximal Shader 42

R

Radius 31
Random 39, 45
Random Alignment 23, 55
Random Offset Along Normal 23
Random Scale 24, 45, 55
Refresh 27, 31, 32
render farm 62
render instances 10
Renderer 19
requirements 2
Ridged Multifractal 28, 30
ridges 28
rivers 27
road 27
road markings 43
Road Shader 43
rock 34
Rotation 46

S

Save 27, 36
Scale 24, 28, 30, 34, 35, 44, 45, 46
Scale by Material 25
Scale by Modifier 25
Scale by Vertex Map 24
Scale by Weight 25
Scale Modifier 7, 26
Seed 9, 11, 23, 24
segmented splines 26, 31
Selection Bias 10
Selection Tag 13
Set Spline Height 29
shaded 10
shader 55
Shader 8, 39
Shape Curve 33
Shaping 29, 33
Shift 28, 30, 35
Show Visualization 37
Sidemarks 43
Size 27, 34
SK 55
Slope 18, 41
Soften 32, 44
Source Data 39
spaghetti 10
Spherical 22
Spline 26, 29, 31
Spline Type 37
SPREADrock Object 7, 34
SPREADscape 63
SPREADscape Object 7, 27
Standard Filters 13
Start 42
Static 21
Static Alignment 22
Static Offset 23
steepness 18
Strength 33, 35
Structure 35
subdivision 27
Subdivision 34
sunny side 18
SurfaceSPREAD 5, 58, 61, 63
SurfaceSPREAD Clone Shader 39
SurfaceSPREAD Commands 48
SurfaceSPREAD Data Node 8, 46
SurfaceSPREAD Distance Shader 42
SurfaceSPREAD library 50
SurfaceSPREAD Library 8, 49
SurfaceSPREAD Object 7, 9, 50
SurfaceSPREAD Road Shader 43
SurfaceSPREAD Shader 8
surfacespread.lic 6
System requirements 2

T

Tab 58
Tag 38
Target 21, 22
Target Alignment 22
Terms of Use 49
Terms of Use 64
thanks 2
ThinkingParticles 46, 47
Time Offset 11
tire abrasion 43
Tire Width 44
Tiremarks 44
Toggle 48
TP emitter 47

Track Size 44
Transfer of license 64
Troubleshooting 63
Turbulence 28, 30
Turbulenz 35
Type 28, 35, 37

U

Up Vector 21, 22
Usage 49
Use Camera 19
Use in Renderer 19
Use Noise 24
Use Phong Normals 21
Use Z axis of 18
User Folder 6
UVW Position 46

V

variation 24
veins 16
Vertex Map 13, 24, 40
virtual hierarchy 10
Virtual Parent 10
Visualization 37
Vray Proxy 55
VrayForC4D 2, 55

W

warranty 65
Wavy Turbulence 28, 30, 35
weather side 18
Width 27, 43
Wire Object 7, 10, 37
wireframe 10
Wireframe 53
workstation 62

X

X Axis 22
XPresso 8, 11, 46

Y

Y Axis 22

Z

Z axis 21
Z Axis 22
Zwischenpunkte 37